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A NEW CONCEPTION OF THE TREATMENT OF TREPONEMAL INFECTION

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I propose this evening to place before you some problems relating to the treatment of syphilis and while doing so I shall refer to my own conceptions based on my investigations for the last three years. Venereal disease has not been a subject of my choice, it has only been an important side-issue. As a medical student, syphilis and its obscure manifestations used to puzzle me. Later in the pre-Salvarsan and pre-Wassermann days I had seen some peculiar cases. A Kraske operation was performed on a patient for what was then considered to be a malignant growth of the rectum; microscopic examination of a section taken after operation did not confirm it. The patient subsequently developed paraplegia and suffered from what we now know to be neurosyphilis. In another case, a swelling on the tibia was provisionally diagnosed to be of neoplastic origin and the question of amputation was being contemplated, when (as a house-surgeon) I put him on hydrarg. and iodides; a linear osteotomy was performed and the excised piece of bone on examination disclosed osteo-periostitis. Radiographic examinations for diagnostic purposes were not available then. The pain subsided and the swelling was reduced. About twenty years later the same patient consulted me; his W. R. was positive and I put him on a course of NAB and hydrarg. He has been free from trouble since. More recently (about twelve years ago) I was consulted for a case of 'delayed puberty' in a Bengali girl of about 17. I found a deep gluteal scar due to an ovarian graft which had not improved her condition. I noticed some heredo-syphilitic stigmata and she underwent a course of novarsenobenzol and bismuth injections and is now a proud mother of several children. I was consulted for a case of intractable gonorrhœa. I felt a nodule on palpating the urethra which looked suspicious on urethroscopic examination. A smear, however, showed gonococci only. I gave him an initial dose of NAB and shortly after this he developed a crop of roseola and accused me and the injection for it. I propitiated his anger and induced him to take an intensive course of treatment. These are but a few of many complexities which early in my career induced me to study the subject. My interest in this study was further intensified by my visits to Europe; I was impressed by the interest which the profession and public bodies were taking in the control and treatment of venereal diseases there, which was in contrast to the indifference and apathy towards it in my own country. It seemed to me that like an octopus these diseases were holding this land in their tentacles and smothering its manhood. Much is being done for tuberculosis, blindness, tropical diseases, maternity

and child-welfare by the State, the Red Cross Society and similar organisations. Nutritional problems are also receiving attention. The disastrous consequences that follow treponemal symbiosis with these conditions do not seem to have been included in the programme of the combat. The insidious destructiveness of syphilis in crippling, disabling and invaliding the individual and the collective effect of this on the degeneracy, decay and incompetence of the nation do not seem to have been impressed on the minds of the public. Indeed, syphilis is one of the most killing diseases. The simulacrum of stigma attached to this disease as being of immoral or amoral origin seems to touch the prudery of the public. It is for us to disabuse the public mind of this taboo and to broadcast the idea that syphilis is not necessarily associated with incontinence or promiscuous sex relation and in order to convince them we can explain possibilities of syphilis insontium and hereditary and familial transmissions as well as the influence of the peripatetic distributors of the infection. This may help public bodies to realise the gravity of the situation and get them interested in organising campaigns against venereal diseases. Syphilis and its treatment have to be studied in view of conditions peculiar to this country. The role which syphilis plays in the etiology of diverse human ailments and its importance in the diagnosis and treatment of masked and obscure conditions emphasise the importance of the study of this subject; of greater importance even is the symbiosis of syphilitic and other infections and particularly in this country of the symbiotic relationship of syphilitic and tropical infections. The medical profession is conscious of its own inadequacy, there seems to be a great hiatus between the present day knowledge and its application. The professional situation regarding syphilotherapy needs reform in the shape of organised team work and responsive co-operation between clinical and laboratory teams and research workers in this connection.

Symbiosis is a combination of the actions of more than one disease; it is not just a sum total of damages caused and pathological conditions produced by the causal infective agents and the clinical conditions cannot be explained by the one or the other. The sub-committee appointed by the Medical Research Council referred to an X-factor in the outbreaks of acute yellow atrophy of the liver in some military hospitals; H. Ruge refers to similar outbreaks. Wilcox thinks that this X-factor corresponds to the symbiosis of diseases. These views emphasise the importance of a closer study of syphilis in this direction.

Looking through the long corridor of the history of syphilis one feels undecided whether to apportion it to the pre-Columbian or post-Columbian eras. While Christopher Columbus has been duly credited with initiating the spread of civilisation in the dark continent of America, he has received the opprobrium of introducing small-pox to the land of his discovery and of being the harbinger of syphilis to the Old World. I do not propose to enter into an unprofitable speculation regarding the pre-Columbian existence of syphilis in the West and the East; the views of the two schools are at variance and with due respect to the authorities I would not take the risk of criticising the claims of extremists. This is just a divertisement; we have before us the subject of treatment and the point of historical interest in this connection is that mercury has been used in both periods for the treatment of skin lesions and in the early days of syphilis the cutaneous lesions being more apparent than other manifestations, mercury was used as the staple remedy for it. The process of realisation that syphilis was a disease protean in its manifestations, demoniac in its destructiveness and potentially subtle in its pathogenesis was slow though progressive with the advances of pathology, microbiology, biochemistry and experimental medicine. From available records it would be seen that 1495—98 was the 'Hydrarg Period' in the treatment of syphilis based as I have stated on the misconception that syphilis was confined to affections of the skin. Encouraged by the effect of the drug in subsiding syphilides or attributing their spontaneous disappearance to that drug, mercury was pushed in hazardously large doses; resulting in a steady increase in toxic cases. This brought mercury to disrepute and was followed by what could perhaps be called a 'Herbal Period' during which concoctions of herbs and drugs of vegetable origin were used with equally disastrous results.

In 1821 Courdet introduced iodine as an antisyphilitic remedy and iodides of starch and iron were freely used in the continent, naturally without success. In 1836 Wallace published a record of 142 cases of what he called constitutional syphilis treated with iodide of potassium. This was followed by a 'Mercury and Iodide Period' with better success.

The introduction of arsenic as a therapeutic agent is of academic interest and the study of the progressive evolution of this therapy resulting in the conception of organic arsenicals as antispirochetal drugs is quite fascinating. The parasitotropic properties of arsenic *in vitro* and *in vivo* were established on an experimental basis but the problem which faced biochemists and clinicians was the reduction of toxicity of the compounds; thoughts were concentrated on finding an organic compound which would have the highest parasitotropism and least organotropism. Bechamp was one of the first in the field and in 1863 he prepared a substance which in his opinion had the formula $C_6H_5NHAsO(CH)_2$. Later, he prepared several salts, notably the sodium salt; Blumenthal passed this salt through animal tests and Scheld used it for general arsenic therapy without any reference to syphilis or trypanosomiasis. Blumenthal had the idea of comparing the relative toxicity of organic and inorganic arsenicals and having found this salt less toxic he called it atoxyl. In spite of the claims for low toxicity of this drug it unfortunately produced serious by-effects such as optic atrophy on being used for African sleeping sickness. Besides, Bechamp's formula and the chemical name arsenanilide applied to it was discredited by Ehrlich.

In view of the neurotropic effects of atoxyl, Ehrlich proposed to substitute the free amino group in it in order to detoxicate it further; but his first attempt at introducing sulphur acid groups detracted its therapeutic properties. His later attempt was a sodium salt of acetyl arsacenilic acid which he christened arsacetin; though experimental work on mice proved satisfactory, its therapeutic use gave rise to optic atrophy.

In order to draw such deductions as could reasonably be drawn from experimental work relating to the action of organic arsenical compounds in spirochætal infections, it became necessary to find an infectious disease which ran a less varied and chronic course than syphilis; trypanosome an organism due to its close biological relationship to spirochætæ was selected. The readiness with which animals could be infected and the rapid course of the disease and fatality of cases of trypanosomiasis were points favourable for experimental study. In their earlier investigations Ehrlich and Hata experimented with the spirilla which finally led to the introduction of arsenobenzol for the treatment of syphilis and other infections. Experiments *in vitro* with atoxyl and arsenobenzols gave virtually negative results. This led Ehrlich to come to the conclusion that the drug underwent changes in the living body which gave it trypanocidal properties. Levaditi and Yamanouchi demonstrated that experiments with atoxyl *in vitro* gave positive results in the presence of liver emulsion. Ehrlich explained this as being due to reducing properties of organ emulsions but other considerations persuaded him to believe that this change was of the nature of a reduction of molecules. Like others, I have been rather sceptical about experiments *in vitro* with regard to spirochæta pallida. The absence of an intermediary host, the microbiological characters of the parasite, the questionable pathogenic character of laboratory cultures of the parasite are facts against it. Besides, the chronicity and diversity of the manifestations which are not necessarily due to the parasites themselves but to a greater or less extent due to their by-products, interactions and toxins are ideas which not only militate against it but are misleading; as a matter of fact some of the early workers with drugs of arsenobenzol group discovered it later.

The direct action of chemotherapeutic agents on the protoplasm of parasites has been studied and discussed largely and it would be needless to enter into a detailed consideration here. We may briefly summarise the main issues in this connection. There may be a direct chemical interaction between the compound as administered or indirectly after its transformation by the vital action of the animal system and some protoplasmic constituent of the parasite resulting in injury or death of the latter; there may be a physical or physico-chemical interaction with the protoplasmic colloids of parasites involving precipitation, coagulation, changes in electric charges, etc., sufficient to destroy or injure the parasites, the production of new ' compounds ' from tissues as a result of the action of chemotherapeutic agents on tissue constituents, these compounds being capable of chemical or physico-chemical interaction with the protoplasmic constituents of invading parasites; the production of antibodies by the release of substances from the parasites. These are in short some of the views foreshadowed on the chemotherapeutic action of parasiticidal drugs. It seems, however, that there are twists in the tangle of these skeins of speculative views. The therapeutic agent is introduced into the host, it undergoes changes before it attacks the parasite. What is the nature of this transformation? How long does this transformative process take and how long should

it remain in the tissues of the host? How can the period of effective retention in the tissues be assured? How can we, besides, ascertain the intimate approach of the agent to the parasite, if they happen to be in seemingly inaccessible zones? In the process of transformation and elimination, do the agents remain in the tissues in effective parasiticidal concentration, for sufficient length of time and in successful contact? Have the elusive parasites, taking advantage of the shortcomings of one or more of the above processes become resistant by selection or mutation? We have to face these questions and a further important and vital one, that of the toxicity of the product to the tissues of the parasite's host. If it does get detoxicated, where, how and to what extent does that take place?

At a meeting held at the All-India Institute of Hygiene in December, 1935, to commemorate Ehrlich's discovery of salvarsan I had ventured to suggest that when Ehrlich announced the birth of arsphenamin he had been considering these problems and the birth of neoarsphenamin was the issue of his later conception. Small in build and physically infirm Ehrlich was an intellectual athlete and a mental giant. The little personal contact I had with him convinced me that in spite of his enthusiasm regarding his discovery he had made a long-range forecast of things that had yet to come. Great things come to those who know how to work and when to wait. There is no finality in scientific research. Ehrlich did not live to see the fruition of his ideas; most workers do not. We know what patient labour and suspense were involved in his great work and what an invaluable gift his prepossessive foreknowledge has been to medical science.

In attempting to solve these problems, I took the following facts into consideration. An animal gets an injection of a drug. It circulates in his system, a part of it escapes, that is, is excreted and a part is retained and stored in the tissues and organs and undergoes transformation by the vital action or in other words biological activity of the system. The drug itself may be primarily of therapeutic value but facts and conclusions tend to prove that the therapeutic value is enhanced and apparently in the case of toxic drugs such as arsenic, bismuth, etc., their toxicity is eliminated by a process of excretion and transformation. The transformation and detoxication is carried out in the living laboratories of the animal system by tissues and special cells of different organs. For reasons which will be stated later, I have come to the conclusion that the liver is the most important of the living laboratories for such transformation and detoxication and for adding immunising properties to the product.

It has been surmised by some that the transformed product is arsenoxide (L. W. Harrison, Tatum, Cooper); this substance has been manufactured chemically and called Mapharsen and it has been claimed that it would be non-toxic, the benzol ring not being present in its constitution. The therapeutic use of Mapharsen, however, has given rise to jaundice and other toxic phenomena and whether the original transformed product is just arsenoxide or some substance of more intricate biochemical nature is not clear. There does not seem to be unanimity in the acceptance of the conclusions arrived at by O. H. Foerester, R. L. McIntosh, L. M. Wieder, H. R. Foerester, G. A. Cooper.

Observations of workers in the field of salvarsan toxicity seem to converge to the conclusion that the toxicity is mostly, if not entirely, due to the aminobenzene radicle which is seized upon by the liver cells; the end-products of this benzol radicle are eventually excreted by the liver in the urine in combination with sulphuric and glycuronic acids in a manner similar to the conjugation of many members of the phenol group (V. E. Lloyd, Harrison, Turnbull, H. C. Semon). It would therefore be desirable for our purposes to obtain the arsenic in the liver after this organ has got rid of the toxic aminobenzene radicle from arsenobenzol.

The liver plays important and diverse parts in the economy of the living organisms; it produces bile, stores and metabolises fat and glycogen and metabolises protein. The liver also possesses remarkable powers of protecting the body against poisons, such as bacterial toxins produced in the intestines, alkalies, metallic salts including those of arsenic, mercury, busmuth, gold, lead, antimony, phosphorus, and alkaloids such as morphine; they are readily taken up by the liver, retained for a certain period and given up slowly. Heger has demonstrated while explaining the detoxifying action of the liver that nicotine, added to blood and made to pass through liver, is removed. Similar results have been obtained with strychnine, atropine and other alkaloids, as well as other poisons.

Many toxic substances, when taken into the body are conjugated with sulphuric acid, or glycuronic acid

to form innocuous substances. It has generally been assumed that these reactions take place in the liver, and tests of liver function have been devised based on this assumption. In cases of fatal poisoning, the liver is preserved as an important organ for toxicological analysis.

It has been said by Wilcox that the toxic effects are more noticeable in the architectural elements of the liver structure than in the liver cells themselves which are not only more resistant but have an inherent and a remarkable power of regeneration, whereas the other elements once damaged are permanently damaged. Be that as it may, even the liver cells would not take things lying down and brook insults indefinitely. In the course of our experiments with organic arsenic compounds we have found on histological examination that after a lapse of time, if the dosage is overstepped, there is a cloudy swelling of the protoplasm of liver cells.

Jiminzezde Asua and Kuhn have shown that after intravenous injections of NAB the reticulo-endothelial cells of spleen, liver and lymph glands become swollen and by appropriate methods of cupro-collargol impregnation the actual granules of NAB (? arsenic) can be demonstrated within the cells. In splenectomised animals elimination of arsenic is slower than in normal animals, which suggests that the reticulo-endothelial system functionates the conversion of NAB into active germicidal substances and their elimination.

One has therefore to take great care to ascertain the dosage and the psychological moment at which the liver cells show the earliest evidences of cloudy swelling or changes in the reticulo-endothelial elements. It has necessarily entailed a very large number of experiments in our laboratory to ascertain the time when to remove the liver and draw our product from it, so that it has the highest arsenic content; and just before histological changes of an irritative nature are manifested in its structure.

The liver is instinctively a detoxifying organ of the animal system; indeed, we would not be attributing to it an undue credit, if we say that it is the most important detoxifying organ of the body.

The degree of therapeutic properties and toxic manifestations produced by organic arsenic preparations are interrelated; they are therefore of much clinical interest. On the other hand there is no definite correspondence between chemical constitution and biological behaviour of compounds. There seem to be some other factor or factors which determine the sequence of biological occurrences. The deleterious influence of arsenobenzols on the liver, as for instance toxic jaundice, has been engaging close attention, and special tests for liver efficiency have been devised to ascertain the nature and extent of hepatotropism caused by these drugs. Jaundice is less common in children as their livers are better protected with glycogen.

There seems to be a halo of mystery about these spirochæticidal drugs, for instance NAB is impotent *in vitro* experiments, it is admittedly potent in the earliest stages of syphilis, whereas tryparsamide is useful in some of the later (neurosyphilitic) stages; chemotherapy has been called upon to explain these anomalies. I have often asked myself, and so have others, has it succeeded in doing so to one's satisfaction? It would perhaps be interesting at this stage to consider for a moment the biological habits and morphology of the spirochæta pallida and the sequence of events that occur in the parasite itself and its host resulting in diverse pathological lesions. Leishmann's work with the spirochætæ of African tick fever (1909) shows the development of the spiral form from their broken up granules. Balfour and others have found granule formation in the spirochætæ of syphilis. Levaditi, Schoen and Sanchis-Bayarri (1927-32) working on these lines found spirochæta-free lymph glands almost invariably endowed with syphilitic virulence. Levaditi with his collaborators Schoen and Mezger (1923) demonstrated histological appearances in which in the earlier stages they were of inflammatory nature and free from spirals and in the later stages the characteristics of a syphiloma and and presence of spirochætæ. Schlossberger (1928) found that the central nervous system of an infected mouse, though spirochæta-free, was virulently infective. McDonagh's conceptions of a spore stage of the virus of syphilis and the involution forms of spirochæta pallida of O'Farrel and Balfour after arsenobenzol injections (1911) are interesting. Nobarro's views about third generation syphilis (1930-33) and Griffith Evan's ideas about chronic and familial syphilis (1932-33) are equally interesting. A reasonable and unbiased consideration of these hypotheses and facts lead us to two inevitable conclusions, that syphilis is not only a protozoal disease but a protozoal *cum* virus disease and that the syphilitic virus passes through a complicated developmental life-cycle in

acquiring these dual attributes. In view of toxicity of organic arsenic preparations (such as arsenobenzols and tryparsamide) is it not incumbent on us to look for some product which would fight the protozoal as well as the virus elements of the infection and whose toxicity has been eliminated?

If we could therefore obtain this 'bound' or 'retained' and presumably transformed and non-toxic arsenic for therapeutic purposes, it would be physiologically economical to the patient who gets an injection of it inasmuch as it would spare his system the effort and labour of transformation and detoxication. The task before me was to find the ways and means of obtaining it to the satisfaction of all concerned.

One of the most important attributes of the liver, therefore, is its protective and detoxifying function. It is a great protector against poisons. At a meeting of the British Medical Association Sir William Wilcox aptly described it as its toxiphylactic function. Thus the liver is a good fighter, it fights with all its tissue elements, its characteristic cells, its blood and glycogen storage, its reticulo-endothelial system with the Kupffer cells. These cells in the sinusoids of the liver in particular and the reticulo-endothelial system generally are the protective elements of the liver; besides the phagocytic, scavenging action of these cells, the Kupffer cells, the fixed phagocytes and later free histocytes are probably the agents for the formation of ferments, antibodies and other substances so indispensable to the defensive mechanism and for the production of general immunity.

Connective tissue cells, histocytes, etc., comprising the reticulo-endothelial system are found in various organs and tissues such as the liver (which of course has the special stellate Kupffer cells), in the spleen, in the connective tissue of the walls of vessels, bone marrow, lymph glands, etc. W. Kolle, H. Hetsch and other immunologists consider that as this reticulo-endothelial system was so widely distributed, it was a possible site of antibody formation.

Herein we have immuno-biological aspect of liver function. Organic arsenic preparations of the arsenobenzol group parenterally introduced into the body is not recovered from the tissues as such. It is not antispirochætal *in vitro;* it attains its parasitotropic properties after an interaction with the tissue elements of the individual. Organic compounds of arsenic are toxic and in one or more departments of the living laboratory, notably the liver, it can undergo detoxication.

Therapeutic use of liver is of ancient origin. It is mentioned in the Ayurvedas and it is recorded that Diascorides and Galen made use of sun-dried extracts of liver. With the advancement of knowledge of organotherapy the use of liver and its extracts have been brought into use clinically on the basis of Hallion's Law:—

> "Extracts of an organ exert on the same organ an exciting influence which lasts for a longer or shorter time. When the organ is insufficient it is conceivable that this influence augments its action, and when it is injured, it favours its restoration."

Stimulation of an organ naturally stimulates its circulation. R. Freund pointed out, taking the liver for an example that the degree of flushing of an organ with blood may be a factor in determining the kind and storage of foreign matter (Virochow's Archiv).

The increase in the reticulocyte cell count in circulating blood is a response to a stimulation caused by liver therapy.

Of the various functions of the liver we are for our present purposes, interested in its detoxicating and immunising functions which according to Harrower and others is considered to be greater than that of any other organ. Harrower thinks that there are a number of ferments and heat-stable substances of the nature of hormones in liver-extracts. Lorand Gilbert and H. Strauss think that the internal secretion of the liver destroys toxic products brought to it and this power of the liver is not dependent on the blood but on the liver tissue itself though the flushing of the organ and its increased blood content would naturally give greater facilities to the tissues to deal with the material. Luciani affirms that hepatic hormones materially influence the functions of the liver.

Kolmer and Yable (1920) found that *in vitro*, arsenobenzol was lytic to washed red corpuscles. In the presence of serum or other protective colloids however, this hæmolytic action was not in evidence. On the other hand there seems to be a possibility of agglutination of red cells *in vivo* as the result of injection of acid solutions of salts of arsenobenzol for in many of the earlier cases of fatal poisoning with it, the presence of multiple emboli were noticed parti-

cularly in the lungs. Kolmer and Lucke also found thrombi in the lungs and other organs of rabbits and rats after intravenous injections of arsenobenzol though these changes did not occur to the same extent after NAB injections.

Intravascular agglutination is prevented, however, by injecting arsenobenzol with a protective colloid such as gelatine (Oliver, Yamada, Kolos). Young in an interesting experimental study found that if serum of goats previously injected intravenously wth arsenobenzol is dialysed, some of the arsenic is removed but the rest is bound to and can be precipitated with serum which cannot be dialysed, nor does it give the usual qualitative tests of arsenic. Inorganic arsenic compounds do not behave in this way. Combined arsenic is found in the blood plasma and red blood corpuscles but not in fibrin, long after free arsenobenzol and NAB are removed. Young concludes reasonably that it is the arsenic which is thus bound in the blood and tissues which is slowly eliminated in the urine and fæces whereas the bulk is quickly eliminated.

Wechselmann thinks that after an injection of NAB reversible non-toxic compounds are formed between arsenic and tissue proteins and that these are of therapeutic potency and according to Schmiedberg from the retained arsenic there is continually but slowly broken off non-toxic but therapeutically active quantities of arsenic.

Dr. Govindan Nair, M.R.C.P., F.R.F.P.S., of Vizagapatam, in an interesting article in the *Journal of The Indian Medical Association* says he found liver extract of much therapeutic value in cases of small-pox.

From the clinical observation of his cases, he came to the conclusion that his patients' power of resistance was definitely increased. In small-pox, the liver and bone-marrow show degenerative changes and focal necrosis. It appears therefore that liver extract activates the protective elements in the liver, presumably through the reticulo-endothelial system of the liver and bone-marrow. Liver extract in this instance seems to exert its therapeutic effect in small-pox which is a virus disease.

Dealing with antitoxic functions of the liver, Langdon Brown says that apart from the reactions against bacterial poisons the antitoxic processes of the body are few and simple and with reference to the protective substances, he says that they are also few, and "the process of rendering a poison harmless by conjugating it with a protective substance is most often carried out by the liver." He also says that glycuronic acid is another important protective substance and the formation of glycuronates after the administration of camphor, morphia and such substances is a function of liver.

From the last three years I have been on the quest of a biologically detoxicated spirochæticidal product containing arsenic, bismuth, etc. My three years of laboratory and clinical work have resulted in the production of such a substance which I propose to call Paritran. Paritran-As, for the one containing arsenic and Paritran-Bi, for the other containing bismuth. I shall for the present deal with Paritran-As and briefly describe the process by which I have been able to obtain it.

A suitable animal is kept under observation for the requisite period. It is put through the usual tests and preliminary preparations to satisfy its biological condition for our purposes. Its body weight and age are taken into consideration to ascertain the approximate weight of its liver; the fact that the size and weight of the liver do not bear a constant ratio to the age and weight of the animal being kept in view. The animal is given an intravenous injection of an organic arsenic compound suitably diluted, the quantity being regulated in accordance with the observations made. The time taken, that is, the psychological moment at which the viable liver would hold the maximum storage of arsenic and just short of experiencing any irritative effects of the drug is ascertained by repeated experiments and serial sections of the liver for histological examination. As has already been said, this organ is liable to give histological evidences of cloudy swelling of its cells and other evidences of irritation if the dosage and time are not controlled in the above manner. The strict observance of these details ensures the full play of the vital action of the liver on the arsenic which retains its intimate, biological relationship with the tissue elements, namely, the polygonal cells, the sinusoids and the reticulo-endothelial system including the Kupffer cells. By its vital activity, the liver participates in transforming the arsenic and giving it specific properties. The liver with its storage of arsenic is removed and an extract made from it by the standard process. The arsenic in this extract I

have reasons to presume has undergone transformation and detoxication.

The qualitative and quantitative tests for the arsenic in this liver extract are made on the principles described by Ruth Alcroft and H. H. Green in the *Bio-chemical Journal* (Vol. XXIX, 4, April, 1935).

Rai Bahadur Dr. K. N. Bagchi, M.B., D.T.M., D.P.H., F.I.C., Chemical Examiner to the Government of Bengal who has been engaged in the investigation of arsenic and other contents of normal organs and tissues, has been good enough to make a quantitative estimation of arsenic in Paritran-As. The arsenic content of Paritran-As, as tested by him is 2·6 mgm. per 100 c.c. that is 0·0026%. Colorimetric tests have fairly well corresponded to the chemical tests.

It is a clear, brownish-yellow liquid and has a specific gravity 1010-1012. Its pH value is 7·4. Tyndall's beam test and dialyser test give it a colloid character. It gives a Onne-Apelt reaction for globulin.

In order to test its toxicity and determining its M. L. D., a series of animal inoculations in graduated doses were made; the maximum intramuscular dose of 10 c.c. to a guinea pig. weighing 250 grms. did not produce any toxic symptoms, the animal being alive and well three months after the dose (at the time of writing). 1 c.c. injected intravenously to a rabbit weighing 500 grms. has had no untoward effect.

The following experiments were carried out in order to test the parasitotropic properties of Paritran-As on spirillum minus. I am indebted to Dr. B. M. Das-Gupta, Offg. Professor of Protozoology, Calcutta School of Tropical Medicine, for the technique of these experiments.

A guinea-pig was infected with spirillum minus from the blood of a case of rat-bite fever. This animal weighing 232 grms. was given successive intramuscular injections of 0·25 c.c., 0·5 c.c., and 0·75 c.c. of Paritran-As and the results were as follows:—

There was toleration after 0·25 c.c. and 0·5 c.c. injections but there was no appreciable diminution in the spirillum minus count in the blood of the animal. After the first dose of 0·75 c.c., there was a decrease in the count of the parasites, the animal was somewhat restless; this dose (0·75 c.c.) was repeated forty-eight hours later for further counts but the animal unfortunately died.

Further experiments are in progress in order to come to more definite conclusions.

It will be seen that Paritran is not a laboratory manufactured product. The injected drug undergoes peculiar changes in close symbiosis with the viable cells of the liver (and perhaps of other tissues and organs). It would therefore be unprofitable to attempt to ascertain its exact chemical nature or propose a chemical formula for it. It is not an arsenobenzol, its aromatic (benzol) radicle which is the alleged toxic element has been eliminated in the urine and it is protected by the vital biological activities of the liver and the animal organism as a whole. The therapeutic properties of Paritran do not necessarily depend on the percentage of arsenic in it, but on the enhancement of its therapeutic properties, detoxication and immunising qualities. This substance is a biologically manufactured product, a transformed product which is a stage therapeutically in advance of arsenobenzol, one which has the therapeutic potency, strengthened by the two other properties obtained from the liver namely, detoxication and immunisation.

Diffusibility of a substance renders it accessible to tissue elements and their interspaces. This new compound Paritran has a pH 7·4, it would therefore not be precipitated by blood and would be readily diffusible. It has been found that serum solutions are more readily and rapidly absorbed than aqueous solutions and that elimination of arsenic in the urine (measured by Abelin's method) lasts much longer after injections of serum solutions than after aqueous solutions. Hence, the tissues bind salvarsan or the transformed arsenic better and more intimately when it is in serum solution and there would be better penetration and a prolonged contact enhancing inhibitive and destructive action on the organisms.

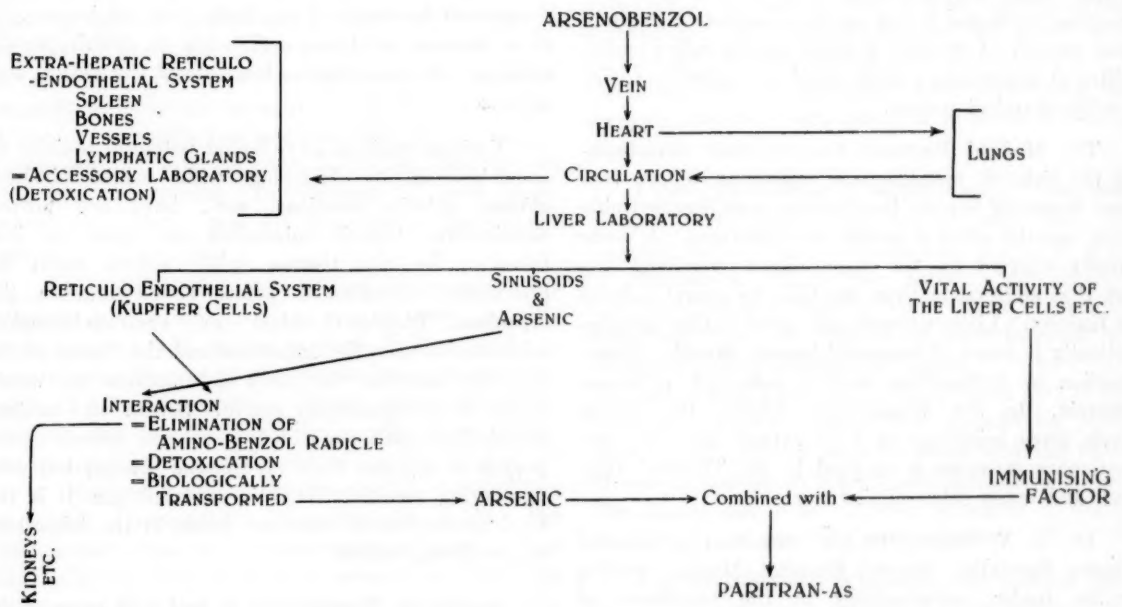
Paritran which is liver extract with arsenic content, I venture to presume has chemico-biological qualities which give it the requisite therapeutic potency. The first factor minimises or shall we say negatives the toxicity of arsenic, and its parasitotropic properties are enhanced by the immuno-biological elements derived from the liver. It would not be unreasonable to presume that the reticulo-endothelial system with the Kupffer cells has been mainly instrumental in imparting this property. The parasiticidal action of the present day antisyphilitic drugs of the arsenobenzol group are mainly by virtue of

their arsenic content. To what extent they arouse the defensive mechanisms of the host is a question that has yet to be answered; treatment resistant cases seem to imply that this action is uncertain and inadequate. In order to obtain the optimum effect, this action should be ensured and intensified. In this connection it might be desirable to consider the facts obscure to our understanding. I have already referred to these facts.

Dr. Biraj Das-Gupta, of the School of Tropical Medicine, Calcutta, in a private communication to me says:—

"Human beings suffering from rat-bite fever do not give a positive W. R. though it has been

A Schematic Representation of the Process of Obtaining PARITRAN-AS



nature and character of infectiousness of the causative agents of syphilis particularly with a view to the existence of a virus element in the infection.

Raiziss' experiments demonstrate the presence of treponema pallida in the brain of the symptomless mouse which on transference to rabbits become neurotropic to the latter, and here we may incidentally refer to rat-bite fever produced by the passage of infection from the anergic rat. Syphilitic lymphadenitic juice is infective though the nodes are spirochæta-free. The transference of infection from the infected male through the apparently immune female to their offspring, cases of familial syphilis and the transmission of a predisposition to neurosyphilis or neurotropism to second and third generations and avirulence of cultivated spirochætæ are stated by some workers that they do so; but a guinea-pig infected with spirillum minus from a human source does give positive W. R. Spirillum minus has not been demonstrated so far in the human blood, there being only one isolated instance of such occurrence. But the blood of man suffering from rat-bite fever taken during the febrile paroxysm, inoculated into a susceptible host, say, a mouse or a young guinea-pig, is capable of producing an infection in these animals in approximately 10 to 14 days. The spirilla can be readily demonstrated in the blood stream of the infected animals, although the appearance of the parasite in the blood is of intermittent character, that is, appearing to-day, disappearing in a few days and reappearing after some time."

John H. Stokes of Pennsylvania University in his Prosser White oration to the St. John's Hospital Dermatological Society (London) anticipates the probability of identification of syphilis with virus diseases.

The transmutation of visible into ultravisible infective agents has been suggested by Kendall in his Patten lectures; he described the granular transformation of spirochæta pallida in aortic focal lesions. Chesney and Brown have discussed the subject of lasting immunity to re-infection in syphilis despite the disappearance of spirochætæ. This according to Stokes brings up the question of immune virus carrier. I wonder if there are so called metabolites of spirochæta pallida which are allied to toxins of a bio-chemical nature.

The Medical Research Council while investigating the risks of arsenobenzol injections report that some degree of hepatic insufficiency was demonstrable three months after a course of injections. I have already referred to the experiments verifying the fact that addition of liver emulsion to atoxyl reduces its toxicity. Liver extracts are given either prophylactically in cases of suspected hepatic disorder (hypofunction or dysfunction) and in cases of salvarsan toxæmia. In the Whitechapel Clinic, Dr. Alwyn Davis gives injections of liver extract and this precautionary measure is adopted in St. Thomas' Hospital and many other clinics now.

Dr. R. V. Rajan, M.B.B.S., M.R.C.P.E., Venereal Disease Specialist, General Hospital, Madras, writing on the major complications in the treatment of syphilis, (*Indian Medical Gazette*, December, 1935) states that he had very gratifying results with liver extract. He writes:—

> " Continued experience convinces us that it (liver extract) should be placed first and foremost among the therapeutic measures in the treatment of dermatitis and other intoxications of organic arsenicals. 'Campolon' a Bayer preparation, was used in these cases."

Dr. V. Govindan Nair, M.R.C.P., F.R.F.P.S., Venereologist and Dermatologist, King George Hospital, Vizagapatam, advocates the use of liver extract prophylactically as well as therapeutically in cases of so called salvarsan dermatitis.

Drugs undergo chemical transformation while circulating in the blood or in contact with tissues. There is thus a triple contact, between the invading organisms, the tissues and the drug, and it is by the active co-operation between the last two that the pathogenicity of the invaders could be inhibited and the organisms exterminated. A single course cure, lethal to the organisms but verging on toxicity to the host, in other words harmful to its tissues, would hardly be rational, because insulted tissues could not be expected to co-operate. On the other hand, divided small doses expose the host to the risk of the organisms gaining tolerance or fastness to the drug. The ideal condition would be, therefore, that the drug could be rendered non-toxic to a minimum and some element be introduced with it which would stimulate the co-operative instincts of the tissues and organs.

Various methods of reducing potential toxicity of arsenobenzols by buffering with colloid bodies, glucose, gelatin solutions, etc., have not proved satisfactory. Certain substances are more or less taken up by the tissues, while others must be chemically transformed before they influence the organism. Physico-chemical or chemico-biological relations between the organisms and the tissues of the host are essential for such interactions as would render it therapeutically active. Serum or cerebrospinal fluid has been added to various arsenic compounds to increase their therapeutic potency but with unassuring results. What is essential for it is the vital interaction of cells and fluids in the laboratory of the living tissues.

Gentlemen, I have tried to deal with some of the intricate and pending problems concerning the treatment of syphilis. The problem is many-sided and has to be viewed from different angles. It would be vainglorious on my part to think for a moment that I am anywhere near the solution of such a big problem. Even the great Paul Ehrlich's race for it has been left unrun; so has it been with others. I do hope that I have not made inchoate and linkless statements and I hope you will consider my conclusions reasonably acceptable. We would like to see India happy, with men and women of average health and fitness, and who as prospective progenitors do not force unsolicited natal gifts of treponemal infection to the unborn. We know that unless syphilis is weeded out root and branch beyond our sky-line India cannot have the health or happiness which is the national birthright of her people.

Here is Paritran for your trial. I hope I am not indulging in undue optimism when I think it may help to undo the great evil and thus contribute to some extent towards the health and happiness of India and perhaps of lands beyond. I hope you would be good enough to give it a trial, even if it be with less optimism than mine; with me its probation has been a period of happy anticipations. I cannot boast of the numerical strength of recorded cases, but my cases, as you will see, are of clinical interest and they have been followed up as far as possible. I have been greatly impressed by the therapeutic response even in cases of neurosyphilis (parasyphilis, metasyphilis) in which the spirals are not found and W. R. is evasively positive—cases in which a dormant granular virus is the presumable pathogenic factor. A proved non-toxic anti-syphilitic drug is avowedly a better selection in these cases than those that are not similarly safeguarded. In Paritran I have every reason to believe, you will find such a therapeutic agent.

It is clear that the therapeutic properties of Paritran preparations are not due to their metallic contents; thus the arsenic content of Paritran-As is only a small fraction of the same content of the drug of the NAB group which is initially injected into the animal; this fraction, however, is the all-important, transformed portion of the arsenic in the drug which is of therapeutic value, the balance of arsenic being discarded, presumably, as arsenious oxide. The therapeutic action of the arsenobenzols therefore does not lie in the total quantity of arsenic in it but that fraction of it which is transformed in the patient's system.

The results of investigations on the fate of arsenic on deep subcutaneous injections of salvarsan carried out by Colonel Bevridge and Major Walker in the R. A. M. College Laboratories (1911) and later supported by Colonel Harrison (1913-1914) are interesting. On analysing the sloughs formed at the site of injection they found that it contained about three-fifths of the arsenic contained in the original dose in the form of arsenious acid, two-fifth only having been absorbed during several months (up to twelve months) and even the small quantity of this absorbed and presumably transformed arsenic produced definite clinical results.

Colonel Harrison's vast experience has led him to recommend intramuscular or deep subcutaneous methods of injections and he advocates research work to find a tolerable method of giving these injections by these routes. I wonder if he would consider Paritran preparations as suitable ones.

Clinicians have now been advocating continuous methods of administration of arsenobenzol alternating or overlapping it with heavy metals; this treatment however necessitates a constant watch for toxic effects, particularly on the liver in this country. It is also a common experience that intensive courses of treatment are liable to cause toxic symptoms. Paritran preparations being protected, have a wide safety margin. Paritran-As and Paritran-Bi can be given alone, alternately, simultaneously, or overlappingly. An intensive course of treatment even with initial large doses can be given with safety in stubborn or resistant cases.

I have formulated a standard plan. The course consists of bi-weekly injections of each dose, commencing with 1 c.c., increasing by 1 c.c. to 4 c.c., of Paritran-As. Thus the patient gets altogether twelve injections, namely, three each of one, two, three and four c.c. This is at once followed by a similar course of Paritran-Bi injections, twelve in all. A break is then made for a Wassermann test or other tests, if necessary. Repetition courses are recommended even after a negative result and the number of courses depend on clinical and serological response. The dosage has to be adjusted according to the age, sex and general condition of the patient.

For intramuscular injections, the suitable site is the upper and outer quadrant of the gluteal area. Paritran injections do not cause any local reactions such as pain or nodosities, particularly if the patient rests a few minutes after the injection.

I must now express my deep sense of appreciation to my friends and colleagues for their kind help and suggestions. In the earlier stages of my work, the late Professor R. N. Sen, formerly Professor of Chemistry, Presidency College, Calcutta, and Dr. S. K. Chatterji, M.B., D.T.M., now a post-graduate student in the United Kingdom, rendered great service to me by their suggestions regarding the detection and estimation of drugs in animal tissues and organs. I have already acknowledged Rai Dr. K. N. Bagchi Bahadur's work in this direction in his own laboratory. Dr. C. C. Basu, M.B., Professor of Pathology, Carmichæl Medical College, Calcutta,

made serial sections of the liver of injected animals on several occasions and gave much valuable advice which I gratefully appreciate. I am much indebted to Sir Nilratan Sircar, Kt., M.A., M.D., D.SC., LL.D., Consulting Physician, Carmichæl Medical College, for many suggestions on clinical and other aspects. Dr. Suren N. Roy, D.SC., of the Department of Biochemistry, Carmichæl Medical College, has been good enough to make colorimetric tests of my products in his laboratory. Dr. Biraj Das-Gupta has most ungrudgingly made many suggestions and as I have already acknowledged, guided us in the matter of the tests mentioned in the text. Dr. M. N. De, M.B., M.R.C.P., Professor of Pathology, Medical College, Calcutta and Dr. A. C. Ukil, M.B., of the Department of Tuberculosis, All-India Institute of Hygiene, Calcutta, have very kindly looked through this manuscript and made important suggestions. Dr. K. C. Chaudhuri, M.B., has rendered me considerable assistance in arranging the typescript and references. To the staff of the Chittaranjan Hospital, particularly to Dr. S. N. Chatterji, M.B., Professor of Operative Surgery and to one of the House-staff, Dr. Narapada Mukherjee, I am indebted for treatment of cases with Paritran and keeping records. I am grateful to Dr. J. M. Modak, M.B., CH.B., M.R.C.P., in charge of the Venereal Department, Chittaranjan Hospital, for his advice and co-operation. I am grateful to Capt. R. Bhattacharya, Radiologist, who has been of considerable help to me with many suggestions.

To Lieut-Colonel K. R. K. Iyengar, M.D., CH.B., I.M.S., Director, Pasteur Institute, Coonoor, I am indebted for looking through this paper and his appreciation of the rationale of my conception of the treatment of syphilis expressed therein is indeed encouraging.

To the team of research workers and my laboratory colleagues, Dr. M. M. Basu, M.B., Dr. S. Mukherjee, M.B., and Dr. P. K. Chatterji, I am grateful for the devotion and loyalty with which they have been working.

I venture to hope that this conception of the treatment of syphilis initiates a therapeutic principle which would be applicable to other conditions than those due to treponemal infections. May these ideas be a prelude to a new departure in the science of therapeutics.

CASE REPORTS.

Cases Treated in the Chittaranjan Hospital, Calcutta

Sundari, 28, female, was admitted for painful gummatous ulcers on the left leg. Her W. R. was 8/10 and Kahn+++ on admission and after three courses of Paritran-As injections both W. R. and Kahn tests were negative.

R. K. A., 38, male, of Jalpaiguri and Burrabazar. He had dual infection, gonorrhœal complications leading to stricture and urinary fiistulæ and a gummatous ulcer in his scrotum. His W. R. was strongly positive and he had three courses of Paritran-As injections before admission in Chittaranjan Hospital (August, 1936), when his W. R. was 6/10. In hospital he had two further courses of injections and left hospital in November, 1936, with W. R. and Kahn negative and the ulcers completely healed. He was glycosuric with high blood sugar. This complicated his case. He has now returned to Jalpaiguri cured of his complaints and in much better general health.

Uler Rahman, 25, male, of Camac Street, admitted on 28th August, 1936, for pain and swelling of the left knee-joint which incapacitated him as a domestic servant. He denied any history of syphilitic infection though his W. R. on admission was 10/10 and Kahn test+++. He had courses of Paritran-As injections and as he wanted to return to his duties in November, his W. R. test was taken and found to be 6/10, Kahn test being negative.

Kalika Prasad, 30, male of Corporation Street, was admitted on 6th August, 1936. He had treponemal infection about six years ago and complained of severe pain in the left knee which kept him in bed. Wife had two miscarriages, W. R. 10/10 in August on admission. He had three courses of Paritran-As injections. The joint pain subsided and he could walk though the joint was still weak. W. R. was reduced to 8/10 and then 6/10 when he had to be discharged at his urgent request.

M. L. De, 50, male, of Rammoy Road, admitted on 12th July, 1936, for swelling of left knee-joint, an ulcer on the scrotum, psoriasis and pealing patches on palms of the hand and soles of the feet. Gave a history of treponemal infection with primary and secondary stages and his wife had two miscarriages. W. R. on admission was 6/10 and Kahn positive. Had courses of Paritran-As injections. Other manifestations practically disappeared. The swelling of the knee persisted though it was reduced. W. R. and Kahn were negative in September, 1936. He was given a further course of Paritran-As for injection when he was discharged.

P. K. C., 32, male, of Beliaghata, admitted on 4th April, 1936, with late secondary syphilis and a serpegeneous ulcer on the scrotum. W. R. on admission 10/10. Had two courses of Paritran-As injections. As he was better, (the ulcer having healed and the skin eruptions disappearing) and he threatened to leave hospital, his blood was taken for W. R. in May, 1936, it was 4/10. He left the hospital signing the usual risk-bond.

Joyraji, 30, female, admitted in February, 1936, for late secondary syphilis. A multipara with a history of miscarriages. W. R. 8/10. Courses of intensive Paritran-As injections were given and in April W. R. was 4/10. She

refused to stay in hospital after the skin condition improved and would not call at the Outpatients' Department for a further course.

Cardoz, 36, male, was admitted on 5th March, 1936, for a penile ulcer. W. R. and Kahn both negative nor could treponema be demonstrated in films. After four full dose injections of Paritran-As the sore healed up. This is a doubtful case.

S. C. Banerjee, 32, male, of Kalighat Road, Calcutta, was admitted on 30th December, 1935. He gave a history of treponemal infection and gave a good description of primary and secondary stages followed by pains in limbs, paræsthesia and limping for which he took admission in this Hospital. He had an ataxic gait, Romberg's sign was present, reflexes were dull. W. R. 6/10 and Kahn+++. A diagnosis of

FIG. 1

FIG. 2

neurosyphilis was made. A movie picture of his gait while walking was taken. (Fig. 1). After two courses of Paritran-As, W. R. was 8/10 but after two more intensive courses his W. R. and Kahn tests were negative. The pains subsided gradually and he managed to stand about and after the third course he could manage to walk about. Further courses of Paritran-As were given and he could walk about freely. In August, 1936, a second film was taken. (Fig. 2). His W. R. is still negative.

OTHER CASES

B. B. Chabri, 52, male, an Engineer contracted syphilis in early age. Originally consulted me in 1916 (over twenty years ago) for ecthymatous syphilide, onychia and peri-onychia and mercurial stomatitis. He refused to have arsenobenzol injections as he said he had seen some serious consequences from it. He was put on iodides and after mercurial symptoms had subsided on guarded doses of mercury. When he saw me in the middle of 1936 he stated that he has had deep ulcers on his scrotum and hands and surface ulcers on both shins evidently of gummatous character as they had left deep and superficial pigmented scars. His W. R. in July, 1936, was 6/10. He had extensive psoriasis, peeling patches on the palms and soles and irregular superficial ulcers with pigmentations on his shins. He had some defect of vision and pain in the eyes and it was found that he had glaucoma; he also had some vague sensory disturbances and weakness in his lower limbs. He now said that having heard of the new injections that I had discovered he had come for those. He had an intensive course of Paritran-As injections and in January, 1937, his W. R. and Kahn were both negative. He has been having Paritran-Bi injections now. The ulcers, peeling patches and onychia have disappeared and his palms and soles are smooth and normal. Some pigmentations are still present.

(This case is presented at the meeting).

Mr. D. B., 42, of Calcutta. This is an interesting 'persistent' case. He had the dual infection in 1910 and consulted me for stricture, prostatitis, vesiculitis and other gonorrhœal complications in 1932. He was under the impression that his treponemal infection had already been eliminated while under treatment at V. D. clinics and physicians during the last several years. In 1934 he noticed a foul discharge from his nose and consulted E. N. T. specialists and was treated at their clinics. As he was not improving he consulted me again early in 1935 and informed me that his recent 'blood test' was 10/10. He was placed on full courses NAB and bismuth and iodides. In October, 1935, his W. R. was still 10/10. He was at once placed on intensive courses of Paritran-As. In April, 1936, his W. R. was 6/10 and the same in July. In November, 1936, his W. R. was 4/10. He had Paritran-As and Paritran-Bi injections and his W. R. test is now 3/10. The trouble in his nose was due to gummatous ulceration and there was perforation of the septum. The ulcer has healed, a small perforation with clean healed margins is present.

Mr. X, 47, of Allahabad, consulted me in 1934. Contracted gonorrhœa and syphilis some years ago. Had courses of NAB and other 'specific' treatment which he thought had made him free of treponemal infection. Several children died of infantile liver and one died soon after birth. He had psoriasis with circumferential pigmentation, persistent neuralgic pains in the shoulders and along arms. Treatment for gonorrhœa, diathermy, hydrotherapy and further NAB injections, iodides, Entodon, etc., had no effect on the pains. W. R. weakly positive 2/10. Early in 1936 Paritran-As injections were commenced. After two courses these pains abated and after further two courses, he was practically free from these. In March, 1937, W. R. was negative.

Mr. R. S., 30, of Mysore. Had gonorrhœa in 1930. Facial paralysis set in within 3 months. Did not know he had syphilis. Gonorrhœa and paralysis treated in various hospitals and clinics (including Kavirajes) without any improvement in his facial condition. Consulted me in October, 1934, for the treatment of gonorrhœal complications and facial paralysis; for the latter complaint he was asked to consult for electrotherapy. He was also given iodides and Entodon injections. This treatment was followed by temporary improvement. In December, 1934, I had his blood tested

and a W. R. 4/10 reaction gave him a surprise. He had three courses of Paritran-As injections and in April, 1935, his W. R. was negative. His facial paralysis was much improved and he found himself gaining in weight and improved in general health. He was recommended a further course of injections in Mysore.

Mr. K. D. J., 35, of Darbhanga. Had Neisserian and treponemal infections some years ago but as he thought that syphilis was cured as he had courses of NAB and other anti-syphilitic treatment, he requested me to treat him for gonorrhœal complications. I found some patches of psoriasis with pigmentations and depigmentations. He also had pains in bones and joints which he thought were of gonorrhœal origin. It looked more like osteo-periostitis. In December, 1935, I had his blood tested in spite of his protestations that it would be negative. His W. R. was 5/10. He had two courses of Paritran-As and he was supplied with a third course of injections as he was returning home. He had altogether four courses of Paritran-As and after suspending treatment for a time, in May, 1936, his W. R. was negative. His syphilitic manifestations were no more visible and pain due to osteo-periostitis was less. He was recommended a further course of injections and it was also suggested that his wife whose blood had not been tested and did not have systematic treatment should have her case investigated. He did not undergo treatment nor was his wife treated. In August, 1936, he consulted again saying he was worse. His W. R. had returned to positive again.

Mr. D. P., widower, married twice. Had 6 issues, one child died of epileptic fits, another of convulsions and a daughter had 'eye trouble' which was diagnosed by an ophthalmic surgeon to be of tubercular character. His personal physician consulted me for an aneurysmal swelling on his neck and a blood pressure ranging from 200 to 240 systolic and 100 to 120 diastolic. He had a genital ulcer in 1908, of which the 'doctor did not take much notice' and cured it with local applications. He had a large pulsating swelling on his neck from sternal notch upwards and a little to the right. There was marked bruit present. Marked pressure symptoms and circulatory disturbances were present. There were vague nerve pains along the upper extremities, confusion of thought, intense paroxysmal headaches and dizziness. Reflexes were irregular and vague nerve symptoms, paræsthesia, distressing itching sensations, etc., were present.

His W. R. in July, was 10/10. He had an intensive course of Paritran-As. After suspending treatment for a month the W. R. was 5/10. According to his doctor's estimation of the aneurysmal swelling "it was 50% smaller." The pressure effects were less.

The constant itching sensation in various parts of the body, was markedly reduced. After two further courses of injection and an interval of one month (in December, 1936), his B. P. was 180/95, the swelling was about one-third its size; W. R. 4/10. A further course of Paritran-As injections were given, B. P. was 175/100 and W. R. 5/10. After the next course, the W. R. was negative. Pressure symptoms gradually disappearing. He has now been placed on Entodon injections.

On perusal of the few recorded cases it will be noticed that there are quite a few which had resisted the standard NAB and bismuth treatment inasmuch as there were none or very feeble clinical and serological response. It would be interesting to observe that the cases responded well to Paritran treatment. The want of response is not an uncommon experience with clinicians and we can only hope that with Paritran these distressing situations, if any, will be rare exceptions.

The case of neurosyphilis (S. C. Banerjee) which responded to Paritran treatment is quite interesting, so is the case of vascular syphilis (aneurysm D. P.) which responded equally well. The case of primary syphilis which was negative to W. R. and film preparations responded to Paritran, I have conditionally called a primary sero-negative case.

I regret I have not been able to present a larger number of illustrative cases as due to unavoidable causes, I had to be away from my hospitals.

Read at a Special Scientific meeting of the Calcutta Branch, *I. M. A.*, on 24th May, 1937.

References

ABELIN—*J. Munch. Med. Wschr.*, 48: 1002, 1911.

ALLCROFT, RUTH and GREEN, H. H.—*Bioch. Jl.*, 29: 1935.

ASHBURN, P. N.—Factors making for low Venereal Record in the American Expeditionary Forces, *Journ. Amer. Med. Ass.*, 73: 1824, 1919. Venereal Prophylaxis, *Ibid.*, 74: 1314, 1920.

BROWN, W. H.—Syphilis, Immunity, Reinfection, Superinfection, *Trans. Eighth Intern. Cong. Derm. and Syph.*, Copenhagen, p. 220: 1930.

BROWN, W. LANGDON and HILTON, R.—Physiological Principles in Treatment, 7th Ed. Bailliere Tindale & Co., 1936.

BAGCHI, K. N.—Observations on Lead and Arsenic-content of Normal Urine and Fæces, *The Patna Journal of Medicine*, 11: 1, 1936.

CHESNEY, A. M.—Immunity in Syphilis, Medicine Monographs, No. 12, Williams & Wilkins Co., Baltimore, 1927.

D'ARCY POWER and MURPHY—A System of Syphilis, Oxford Medical Publications.

DALE, H. H.—Medical Research Council, Special Report Series 58: p. 61, 1921.

EVANS, GRIFFITH—Developmental Cycle of Treponema Pallidum, *Brt. Med. Journ.*, Sept. 9, 1933.

EVANS, G.—Essays on Chronic and Familial Syphilis.

FINDLAY, G. M.—Recent Advances in Chemotherapy.

FOERESTER, O. H., MACKINTOSH, R. L., WEIDER, L. M., FOERESTER, H. R. and COOPER, G. A.—*Brt. Jour. Ven. Dis.*, 12: 1936.

FREUND, R.—*Virchows Archiv.*, 286: 1932.

HARRISON, L. W.—Some Aspects of the Epidemiology of Venereal Disease, *Proc. Roy. Soc. Med.*, 24: 1080, 1931.

HARRISON, L. W.—Treatment of Early Syphilis, Inquiry and Recommendations of League of Nations Health Organization, *Brt. Jour. Ven. Dis.*, 11: 69, 1935.

HARRISON, L. W.—*Med. Annual*, p. 463, 1929.

HARRISON, L. W.—Diagnosis and Treatment of Venereal Disease in General Practice, 4th Ed., p. 257, 1931.

HARROWER, H. R.—Practical Hormone Therapy.

HARROWER—Organotherapy.

INGRAHAM, N. R.—The Life History of the Treponema Pallidum, *Amer. Jour. Syph.*, 16: 155 1932.

JIMINEZ DE ASUA, F., KUHN, M. J. and TORINO, A.—1928, Salvarsan et Systeme Reticulo-endothelial, *Comptes. rend. de la Soc. de Biol.*, 99: 15.

KAST, C. C. and KILNER, J. A.—Concerning the Cultivation of Spirochæta pallida, *Amer. Jour. Syph.*, 13:419, 1929.

KENDALL, A. L. and JAMES, A.—Patten Lecture in Bacteriology, July, 1931.

KOLLE, W. and H. HETSCH—Experimental Bacteriology—EYRE, J.

KOLLIS, A. C. and YOUMANS, J. B.—*Bull. Johns Hopkins Hosp.*, 34: 149, 181, 1923.

LEVADITI, C., SCHOEN, R., VAISMAN, A. and HABER, P.—Recherche du Treponema Pallidum dans les ganglions lymphatiques peripheriques des souris syphilisees experimentalement, *Comptes rend. de la Soc. de Biol.*, 115: 491, 1934.

LEVADITI, SCHOEN and SANCHIS-BAYARRI,—*Bull. de l'Acad. de Med.*, 97: 149, 1927.

LEVADITI, SCHOEN and VAISMAN—*Comptes rend. Soc. de Biol.*, 110: 373, 1932.

LEVADITI, SCHOEN, VAISMAN and CONSTANTINESCO—*Bull. de Acad. de Med.*, 109: 813, 1923.

LLOYD, V. E. and LLOYDN, L.—Urinary Excretion of Novarsenobillon in Syphilis, Discussion—HARRISON, TURNBULL, BURKE and SEMON—*Brt. Jour. Ven. Dis.*, 6: 1, 1930.

LEREDDE, E. and RUBENSTEIN, M. Q. V., LEREDDE E., DOMAINE—Treatment et Prophylaxie de la Syphilis, Paris, 327, 1917.

LEES DAVID—Diagnosis and Treatment of Venereal Diseases, 1937.

MCDONAGH, J. E. R.—The Biology and Treatment of Venereal Diseases, Harrison & Sons, London, 1915.

Idem,—Links in a Chain of Research on Syphilis, Harrison & Sons, London, 1916.

NAIR, V. G.—Post-Arsenobenzol Cutaneous Reaction, *Ind. Jour. of Venereal Diseases*, 1, 1935.

NAIR, V. G.—*Journal of Indian Medical Association*, 1935.

O'DONOVAN, W. J.—Medical Research Council, Special Report Series, 58: 20, 1921.

PROSSER WHITE ORATION—The Control of Syphilis.

RAJAM, V.—Complications in the Treatment of Syphilis, *Ind. Med. Gazt.*, 70, 1935.

RUGE, H.—*Derm. Wschr.*, 94: 278, 1932.

RICHARD DRURY, D.—The Practitioners' Library of Medicine and Surgery, Vol. 1.

SALEEBY, E. and GREENBAUM, S. S.—Comparative Biologic and Histologic Study of Lymph. Glands from Syphilitic Patients, *Jour. Amer. Med. Assn.*, 96: 98, 1931.

SCHAMBERG, J. F. and WRIGHT, CARROL S.—Treatment of Syphilis.

SCHAMBERG, J. F. and KOLMER, J. A.—Toxicity and Physical Properties of Neoarsphenamine of Different Manufacture, *Jour. Amer. Med. Assn.*, 100: 180, 1933.

SCHLOSSBERGER—*Arb. aus d. Staatsinst. f. exp. Therap.*, 21: 345, 1928.

STOKES, J. H.—*B. J. Derm., Sy.*, 48: 2, 1936.

STOKES, J. H. (and others)—*Amer. Jour. Med. Sci.*, 1934.

"Syphilis Treatment following an Inquiry in Five Countries carried out under the Auspices of the Health Organisation of the League," *Quart. Bull. of the Health Organization*, 4: 1935.

TURNER, T. B. and CHESNEY, A. M.—Experimental Yaws: Comparison of Infection with Experimental Syphilis, *Bull. Johns Hopkins Hosp.*, 44: 174, 1934.

VOEGTLIN, C. and THOMPSON, J. W.—*Jour. Pharm. and Expr. Therp.*, 20: 85, 1922-23.

WARTHIN, A. S. and OLSEN, R. E.—The Granular Transformation of Spirochoeta Pallida in Aortic Focal Lesions, *Ibid.*, 14: 433, 1930.

Idem—The Apparent Sequence of Spirochaetes and Granular forms in Syphilitic Buboes, *Ibid*, 15: 145, 1931.

WALKER, G.—Venereal Disease in the American Expeditionary Forces, Medical Standard Book Co., Baltimore, 1922.

WILCOX, SIR WILLIAM—Toxic Jaundice and Anti-syphilitic Treatment, an Address, Medical Society of Venereal Diseases, *Brt. Jour. Ven. Dis.*, 9: 1913.

IMMUNITY RESPONSE IN SEPTICÆMIA

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In dealing with the subject an attempt will be made to omit highly technical and controversial matters, and reference will be made only to facts which will interest the general practitioners. By "immunity response in septicæmia" is meant the response that is obtained in cases of septicæmia by injections of antigens and antibodies, which are many in number, a choice from which becomes, at times, a difficult problem for many of us.

The most dangerous form of infection is characterised by the invasion and proliferation of a micro-organism, in the circulating blood. The term "septicæmia" is best reserved for those instances in which an invasion of the blood stream and hence of the tissues with living active pathogenic organisms, takes place. Microbes causing septicæmia are many in number and septicæmia caused by only three microbes *viz.*, streptococcus, staphylococcus and meningococcus are being taken up.

Diagnosis depends chiefly upon blood culture. In many cases, carefully taken history and temperature chart help a great deal in identifying septicæmia. In some cases, (particularly the cases of meningococcal septicæmia), a very high increase in the percentage (90 to 95%) of polymorphonuclear leucocytes with a total count of 15 to 40 thousand white blood cells gives an idea. While admitting practical difficulties of obtaining a positive blood culture, in every case of septicæmia, I would like to assert, with all the emphasis I can command, that blood culture is of paramount importance before coming to a final decision regarding diagnosis and proceeding with drastic steps. A single instance will be convincing.

There was a case of high fever attended with alternate calmness and nervous irritability in a doctor's family. The doctor sent a blood smear for microscopic examination and report of " M. P. not found;" with a " moderately high percentage of polymorphonuclear leucocytes" was obtained. The negative report was ignored and a cerebral type of malaria was diagnosed. Quinine was given intramuscularly and the patient succumbed within 48 hours of the illness. A second case in the same family with practically the same clinical picture occurred within a fortnight after the death of the previous case. This time also, the same ill-fated diagnosis was made without blood culture and intravenous quinine was decided upon. Fortunately, another consultant took up the case and diagnosed it to be a case of septicæmia and blood culture was insisted upon, when meningococcus was isolated from the blood. This case, which started with bacteræmia without meningeal symptoms which developed later on, was saved after a protracted course of treatment with meningococcus antibacterial serum.

How does septicæmia take place? Streptococcus and staphylococcus have a remarkable tendency to break the inflammatory barrier which is established at the site of the infection. Normal habitat of these two organisms is the skin and the mucous membrane. Slight scratch or breach in the continuity of the surface of the cutaneomucous envelope of the body may lead to inflammation of the lymphatics of the neighbourhood. Bacteræmia ultimately develops. When the circulation is invaded with bacteria, necessarily they reach the liver and the spleen, which are full of reticulo-endothelial cells and the phagocytic property of the reticulo-endothelial system is soon manifest. The organisms mixed with blood lie on the edges of the stream and come in contact with the R-E cells which line these spaces. This gives the stimulus to phagocytosis. "Sometimes, it is a boil on the face, sometimes, a carbuncle on the neck, sometimes a sorethroat, benign to all appearances, opens the door to generalised septicæmia by streptococcus or staphylococcus."

How does meningococcus septicæmia occur? "Infection follows contact with an active case or a healthy carrier. Meningococcus from the mucous membrane of the nasopharynx may penetrate through the lymphatics along the olfactory nerves to the meninges—in that case, symptoms of meningitis first

develop. Direct extension through the bony walls of the sphenoidal sinuses or by way of nasal sinuses through the lymphatics are also considered as channels of invasion."[1] Here also meningitis first develops. In both cases, the central nervous system early becomes the seat of chief involvement and the organism gets an entrance into circulation subsequently and a condition of meningococcus septicæmia thus occurs at a later date. But there are cases where meningococcus septicæmia occurs without the development of meningitis and the blood culture, if done with a good quantity of blood, generally gives a positive finding within 24 hours of the affection. Meningococcus meningitis, as an experimental disease in the monkey and as an infectious disease in the human being, is not only localised in the meninges of the cord and the brain, but is also a septicæmia.

When a definite diagnosis of streptococcus or staphylococcus or meningococcus septicæmia is made, the practitioner is confronted with a long list of antigens and antibodies to make a choice from. It can be safely stated, without much fear of contradiction, that for the treatment of infections, serum therapy is of great importance, whereas vaccine therapy is of value when we think about preventing an infection by development of immunity before infection takes place. " Immunisation with vaccines requires time for the active immunity to develop" and hence we always think about the treatment of acute septicæmia in terms of serum therapy because ' 'when infection is generalised and tissue resistance of the patient is at a low level, the use of vaccine is limited and the failure of vaccine therapy in such cases as streptococcus septicæmia is notorious." Nevertheless, vaccines are useful under certain conditions and in certain chronic types of infections of low grade.

The subject-matter restricted to immune therapy, as it is, warrants a consideration of the following:—

(1) Antibacterial Serum, (2) Antitoxic Serum, (3) Antitoxic and Antibacterial Serum, (4) Sero-Vaccines, (5) Sensitised Vaccines of Besredka, (6) Toxoids and Vaccoids, (7) Vaccines, (8) Detoxicated Vaccines, (9) Ecto-antigens like Immunogens, etc., (10) Bacteriophage, (11) Immuno-transfusion, (12) Auto-hæmo-therapy, (13) Foreign protein therapy, *e.g.*, milk or Omnadin and (14) Dissolved Vaccines.

For the better understanding of the process of immunity, a brief outline of how they are prepared along with how they produce immunity and their efficacy may be thought necessary.

(1) *Antibacterial serum* is produced by injecting horses with living cultures of organisms intravenously in slowly increasing doses once a week or on three successive days every week. There is generally a high rise of temperature which comes to normal within 24 to 72 hours indicating a rise in anti-endotoxic titre. When after repeated courses of injections the test serum gives high agglutinating titre, the animal is bled.

Staphylococcus antibacterial serum does not confer any considerable degree of immunity. Besredka has very rightly put in his book *Immunity in Infectious Diseases* that " few bacteriologists can boast of having had in their hands an efficient anti-staphylococcic serum. Without being accused of exaggeration, we can assert," he continues, " that there are few pathogenic microbes known which are as bad producers of antibodies as the staphylococci." I have witnessed the death of many cases of staphylo. septicæmia, the primary seat of infection being the face. In these cases nothing could save the patients. On the other hand, very small doses of vaccines have been able to turn the table and save the lives of some.

Streptococcal antibacterial serum therapy may be safely regarded as successful, as it supplies bacteriolysins, agglutinins, increases opsonic index and creates phagocytosis. Failures may generally be attributed to infections other than streptococcal. An analysis of puerperal septicæmia cases shows the prevalence of B coli in 60 per cent. of cases in some hospitals.

Meningococcus antibacterial serum has given moderate result, if used fresh, with a mortality of nearly 40 to 50 per cent. The action of this item depends much upon the infective type of meningococcus which is often times, far from the typical, as the author and others in the line have repeatedly pointed out in their published papers.[2(a)]

The author sent two transplants of 6A Group of meningococcus to Dr. A. B. Wadsworth, Director of Division of Laboratories and Research, State of New York, Department of Health; and he has recently received a report about these strains in the following personal communication from America, dated 22nd July, 1936, " From the tubes marked

P154 and P200, we obtained apparently pure cultures of a Gram-negative pleomorphic micro-organism. Films of these cultures contained cells varying in shape from coccoid forms, which occurred singly and in pairs to longer bacillary forms."

He then corroborated the author's findings regarding their properties, namely. " Pleomorphism growth on unenriched media; failure to ferment dextrose, maltose, lactose and saccharose; lack of significant agglutination in monovalent antimeningococcus rabbit or polyvalent horse sera." This was the group of organisms, that was responsible for a large number of deaths[2(b)] in the year 1934-35, as reported in the *Antiseptic*[2(c)] (Aug., 1935) and a full study of this organism has appeared in the *Journal of Bacteriology*. Some Hospitals in U. P. report of the mortality being 20 per cent. only with meningo. antibacterial serum, this is very encouraging no doubt. In some other hospitals better results were obtained by injecting along with specific antibacterial serum some amount of fresh normal horse serum or human blood for supplying complement, which is generally absent in septicæmia cases.

Opinions vary very much, regarding how to measure the potency of antibacterial serum. The consensus of opinion is in favour of mouse protection test. Wadsworth claims, on the other hand, (particularly in the case of anti-meningococcus serum) that "while the agglutinative reaction is adequate, it suggests the degree of polyvalency and sera of high agglutinative titre have proved effective as therapeutic agents. The result of bacteriotropic reaction of sera is not considered sufficiently uniform to warrant its inclusion as routine test. The practical value of complement fixation test has not been demonstrated."

(2) *Antitoxic serum* is produced by injecting subcutaneously exotoxins, as distinct and separate from endotoxins in slowly increasing doses.

Dochez's streptococcus antitoxin is prepared by permitting scarlet fever strains of hæmolytic streptococcus to grow in agar which had previously been injected in a mass in the subcutaneous tissue of horses. Dochez's theory is that streptococci protected from immediate destruction grow in the agar and produce poisonous substances (exotoxins) within the body of the horse. The Dicks immunised horses by injections of increasing amounts of toxic filtrates that is the exotoxin from scarlatina strains. Birkaug immunises horses against living cultures and toxic filtrates of streptococcus erysipelas. After a consistent regimen of active immunisation of these animals for a long time, the serum was found to contain a high concentration of antitoxic and antibacterial substances. It is interesting to note that strains of staphylococcus found by Burkey to be active producers of lethal toxin were isolated from conjunctivæ of man. The Bundaberg disaster in Australia in 1928, in which 12 out of 21 children died within 24 hours after the subcutaneous injection of diphtheria toxin-antitoxin preparations, contaminated by staphylococcus aureus, led to extensive studies on exotoxin production by Burnet, Burkey, and others. By cultivating staphylococcus aureus in semisolid agar cultures in an atmosphere of CO_2, potent exotoxin has been prepared and staphylococcus antitoxin therapy has been ushered in.

Regarding meningococcus, though Murray and Gordon originally claimed that the toxic substance was an endotoxin, Shwartzman's theory is that it produces an exotoxin and that Shwartzman's skin sensitivity test is an efficient method for measuring the antitoxic strength of the serum. Ferry, Norton and Steele have succeeded in growing meningococcus in the form of a heavy pellicle (just as in the case of diphtheria) in special liquid medium where meningococcus has been found to eliminate exotoxins. While Ferry reports the production of a specific antitoxin.

Blindness as a result of experimental meningococcus infection has been given thorough trial to by antitoxic as well as antibacterial serum, by Ferri and it has been shown that it can be cured only by antitoxin and not by antibacterial serum. We have come across with cases of persistent complete blindness, even our professional brethren have not escaped, from this dangerous condition, after the cure of cerebrospinal meningitis which means that they could probably have been cured, had they been treated with antitoxin and not antibacterial serum or antitoxin as well as antibacterial serum. This shows definitely the importance of antitoxic meningococcus serum.

Sara E. Branham has given a thorough trial to meningococcus antitoxin and in her recent paper entitled "Serum Studies in Experimental Meningococcus Infection, in rabbits and guineapigs, read in December 1935, she concludes "On the whole, the animals receiving the antitoxin showed a somewhat

lower mortality than those receiving the polyvalent serum but the difference was not great enough to be impressive." Whereas Banks[3] found that " the antitoxin was potent for types I and III, but its potency in type II meningitis was much more doubtful." The secret of success in the treatment of meningitis will thus be a judicious combination of both antitoxic as well as antibacterial serum. The best method of production of these sera is in finding out and using only a limited number of antigenically broad and efficient strains only and not using all strains, foreign and local, right and left. Atypical but epidemic strains also must be closely studied for antigenic broadness and efficiency and then selected for preparation of both antitoxic and antibacterial serum.

(3) *Antitoxic and Antibacterial Serum.* The horses are injected alternately with increasing doses of exotoxin subcutaneously and living cultures intravenously or subcutaneously in previously injected agar-agar. When both the antitoxic and antibacterial titre reach a definite standard, the animal is bled; or the antitoxins and antibacterial sera are produced in separate horses and subsequently they are mixed up.

(4) *Sero-Vaccines.* Just to give the combined effect of passive immunity which passes off quickly but which is necessary for the treatment of acute cases and of active immunity which takes some time to develop, this happy combination of serum and vaccine is sometimes taken advantage of. In these cases a small dose of vaccine is combined in the syringe with the corresponding serum and injected straight off subcutaneously. This item has generally given very good results in early cases of streptococcus septicæmia.

(5) *Besredka's Sensitised Vaccines.*—The microbes emulsified in physiological saline are placed in contact with highly agglutinant corresponding serum for sometime. The microbes are soon found to come together in a mass and fall to the bottom of the test glass. The deposit of microbes, still living, is well washed several times with normal saline until the last trace of serum has disappeared. The white mass thus obtained forms a fine, very homogeneous emulsion. This is what is known as sensitised vaccine.

Sensitised vaccines are used for preventive vaccination for the first time by Levy and Hamm in the year 1909, for the prevention of streptococcic infection and in 1910, by Besredka for preventive vaccination against typhoid and cholera. The idea of this prevention is, in the words of Besredka " to borrow from the serum only the specific substances, while eliminating the albuminoid and other matters, which are found in the sera." The microbes which fix up the antibody, never let it go again, even after repeated washings with normal saline.

Besredka claims that sensitised vaccines confer immunity very quickly, gives rise to no reactions, local or general, and the immunity conferred is durable. The most important point in favour of this item is that there is no negative phase. Experiments on mice and other laboratory animals, by Dopter and Marie amongst others, have given very hopeful results. But the most important drawback is that there are living microbes, though attenuated, and the practitioners are well justified in thinking thrice before adopting the measure. But are they not using smallpox vaccines, or B. C. G. vaccines, which also contain living organisms?

In order to verify whether Besredka is still an advocate of *living sensitised vaccines* portions from the following personal communication dated the 22nd May, 1936, may be referred to:—

> " I think that the living vaccines which are sensitised are incomparably superior from the point of view, of their efficacy to vaccines killed by heat, both being similarly inoffensive. I would add also that the complaint of local reactions, which are frequently observed after injections of dead vaccines, is scarcely charged against sensitised vaccines. I have not yet changed my opinion concerning this last item, since the publication of my book Immunity in Infectious Diseases. As to curative value, these vaccines find their indications in those cases where the malady is of some duration."

We meet with cases of chronic meningitis which may be given a thorough trial by this item, apart from trying this item as a prophylactic. I have injected horses with living sensitised meningo. vaccines even in big doses without much local or general reaction and they have developed greater powers to withstand bigger doses of meningo. intravenously, than in the case of ordinary vaccines.

(6) *Toxoids and Vaccoids.* Toxoids are prepared by the addition of formaline to the exotoxin, for the

purpose of detoxication and vaccoids are vaccines and toxoids combined.

Dolman found staphylococcus toxoid of controlled potency exceedingly useful in the treatment of more than 300 cases of staphylococcus infection. Murray also reports favourably about the result of treatment by staphylococcus toxoid in more than 100 cases.

(7) *Vaccines.* These are suspensions of dead bacteria in a neutral medium sterilised either by heat or by chemical agents, *e.g.*, formalin, ether, etc.

How does vaccine act at all? Does it act in the way advocated by Besredka, that is, to say in his own words—"They have the effect of saturating the affinity, which the receptor cells, as yet unaffected, have, for the organisms. Vaccines desensitize these cells and so render them unfit to enter into relation with the organisms. Prophylaxis of healthy receptor cells is the idea. As for the cells which are already infected, Nature, the healer, in the form of phagocytes, is able to succeed in overcoming the microbes which have invaded them." Have the vaccines no curative titre? Can they not help us in curing some diseases at least? I have seen cases of facial cellulitis leading to septicæmia doing very well with vaccine therapy and I have seen serum therapy to fail miserably in most of such cases. It is very difficult to pronounce a definite opinion.

(8) *Detoxicated Vaccines.* Vaughan was the first to note that microbes could be split into a toxic and a nontoxic fraction. The toxic substance is, in his opinion, the cause of anaphylaxis. Thompson's attention was directed towards the antigenic value of nontoxic fraction which he precipitated out from the toxic fraction. As there is no reactionary fever, this item has particularly been taken advantage of, in some cases.

(9) *Ectoantigens.* Horder and Ferry extracted the antigenic substance from the bacteria grown in solid media by washing them in normal saline in a centrifugal machine, while the toxic principles were left behind. This method of preparing 'Immunogens' has been extensively tried but the effect is not at all wellmarked, excepting in the case of pneumonia, which I will come to, later on.

(10) *Bacteriophage.* The mode of action of bacteriophage inside the body of the patient is not clearly understood. Conditions in the test-tubes are quite different from those in the human system. Pus, blood-serum, and probably also tissue juices exercise influences that may hinder the lytic action of this agent. It appears to be absorbed by various colloids and to be eliminated from the body rather promptly. In some cases, it has been found out to be a very successful weapon in the hands of the practitioners. In addition to the injurious effects on the microbes, the phage also possesses some value as a vaccine; in part because of bacterial disintegration products present in the bacteriophage preparation itself and in part because of the products of the disintegration of the infecting bacteria in the body of the patient.

Sewage, cowdung, horsedung, pigeons' excreta are rich in streptococcus and staphylococcus bacteriophage which can be activated by serial passages on corresponding strains of bacteria. D'Herelle calls attention to the few races of streptococcus bacteriophage, so far found. The majority of the strains seems to be resistant, but apparently very little work has been done on the subject. MacNeal and Frisbee have reported a study of 15 patients of staphylococcus septicæmia with intravenous injections of staphylococcus bacteriophage, prepared in the asparagin medium. The injections are started with a very small dose and continued with doubling of the dose, until there is evidence of shock to the patient, *i.e.*, a chill or a distinct rise in temperature or both. This item, seems not to have been given a thorough trial.

Regarding meningococcus bacteriophage I have not yet come across with any literature. While culturing cerebrospinal fluid from different hospitals, we found lytic zones along with the growth of meningococcus, in one particular case, of cerebrospinal meningitis, quite by accident. The idea at once struck us that it is quite possible that there has been phage developed in the cerebrospinal fluid. We increased the potency of the phage against that particular strain of meningococcus, through repeated passages in a special medium. And now, I am in possession of polyvalent virulent meningococcus bacteriophage, which is not only able to lyse that particular strain of meningococcus but serologically different typical and atypical (including 6A Group) local strains and foreign standard strains of meningococcus.

This phage has given encouraging results in experimental meningococcus septicæmia in the rabbit as will be explained in the following experiment.

Two rabbits were treated intravenously with 15,000 millions of 6A Group of Meningococcus (details of this group in the *Journal of Bacteriology*, September, 1936). After 1 hour 1 c.c. active phage was injected intravenously in rabbit No. 1 weighing 1050 gms. and in the other (No. 2) weighing 1250 gms., 1 c.c. of phage inactivated (at 65°C for ½ hour) was injected intravenously. After 6 hours, No. 1 was found to be normal whereas the rabbit No. 2 was found to be drowsy; up to 24 hours the same condition continued; after 54 hours No. 2 came to almost normal condition and after 78 hours it was found to be quite normal. 6 hours after the injection of 15000 millions, No. 1 and No. 2 both showed plenty of meningo, as cultured from ear vein. After 24 hours, ear vein blood showed no meningo. in both; whereas heart blood culture from No. 1 after 54 hours showed only one colony, and in the blood culture from No. 2, plenty of meningo was found. After 78 hours, though the clinical condition improved in No. 2 as well, meningococcus was still found from heart-blood; whereas blood from No. 1 was found to be sterile. Agglutination test was done after one week. A curious phenomenon was observed which I cannot explain now. In No. 1, *i.e.*, in that treated with active phage, agglutination was negative, in serum dilutions from 1 in 100 to 1 in 600 but it was found strongly positive in serum dilutions from 1 in 800 to 1 in 3200. Whereas in No. 2, *i.e.*, in that treated with inactive phage, agglutination test was found strongly positive in serum dilutions beginning from 1 in 100 to 1 in 3200. From No. 1, we tried to isolate phage after 78 hours, it was isolated but found to be of low virulence in comparison with the phage originally injected which corroborates the idea that the phage does not increase in virulence in contact with microbes in the blood—but on the other hand there is every possibility of its being adsorbed. This is the reason why we used repeated doses in the next experiment.

In the next series, rabbit No. 3 weighing 1175 gms. and No. 4 weighing 1500 gms. were taken, and 30,000 millions organism was intravenously administered in each case. In No. 3 after 1 hour 1 c.c. active phage was intravenously given which was repeated every 2 hours for 6 doses. Whereas rabbit No 4 was intravenously treated with 1 dose of inactivated phage. No. 4 died within 24 hours whereas No. 3 was saved. The animal was watched for one week. The same agglutination picture and the same kind of phage of low virulence was isolated this time as well.

This experiment shows that rabbit No. 3 was saved by repeated administration of phage. I do not claim that this experiment proves anything conclusive. But it gives us a promising result in experimental rabbit. I propose to send samples of this meningophage for trial in cases of meningococcus septicæmia by the I. V. route. I may be permitted incidentally to mention that this phage will also be introduced intrathecally in cases of cerebrospinal meningitis, and results will be keenly observed in different hospitals here and abroad.

(11) *Immunotransfusion.* A donor whose blood is compatible with that of the patient, is given a vaccine prepared from the sufferer's organism. The donor is also injected with sodium nucleinate to bring about leucocytosis. If the vaccine is injected subcutaneously it is said that the immunising response is well established by the end of 5 hours, after which time the donor's blood is transfused into the patient. There is another and a more difficult method of treatment advocated by Prof. Codham, which is by inoculation of septic anti-serum, obtained from immunised rabbits against numerous strains of streptococcus and staphylococcus of septicæmic origin for a long time, combined with transfusion of normal human serum. 85% of his cases of septicæmia responded successfully. There is generally a loss of complement from the blood of patients suffering from septicæmia—hence some advocate the injection of fresh normal human serum or in some cases fresh normal horse serum, along with the specific antiserum to supply complement.

(12) & (13) *Foreign Protein Therapy, e.g.*, milk or autohæmotherapy not generally used in acute conditions for fear of high reactions, which have given good results in chronic cases. But Omnadin which is said to be derived from bacterial bodies is extensively used as there is no reactionary fever with moderately good results.

(14) *Dissolved Vaccines.* This is a new item, which is derived from dissolution of bacterial bodies by sodium lauryl sulphate—but this item has not sufficiently been given trial to.

The following Chart indicates in short, the merits of the different items in the treatment of septicæmia.

CHART IV

Rabbits	After 6 hours		After 12 hours		After 24 hours		After 54 hours		After 78 hours		After one week Agglutination test	
	Clinical condition	Blood culture from ear-vein	Clinical condition	Blood culture from ear-vein	Clinical condition	Blood culture from ear-vein	Clinical condition	Heart blood culture	Clinical condition	Heart blood culture		
No. I. (1050 grm.) 15,000 mil. organism I. V. and 1 c.c. phage I. V. after one hour	Normal	Meningo plenty	Normal	Negative	Normal	Negative	Normal	Meningo 1 colony	Normal	Sterile	—	+++
											Phage isolated. Virulence—low	
No. II. (1250 grm.) 15,000 mil. organism I. V. and 1 c.c. inactivated phage I. V. after one hour	Drowsy	Meningo plenty	Drowsy	Negative	Drowsy	Negative	Almost normal	Meningo plenty	Normal	Meningo still present	+++	++++
No. III. (1175 grm.) 30,000 mil. organism I. V. and after one hour 1 c.c. phage I. V. phage repeated every 2 hrs. for 6 doses	Normal	Meningo plenty	Normal	Negative	Normal	Negative	Normal	Meningo few colonies	Normal	Negative	—	+++
											Phage isolated. Virulence—low	
No. IV. (1500 grm.) 30,000 mil. organism I. V. and one hour after 1 c.c. in activated phage I. V.	Drowsy and Dozing	Died, Heart blood culture—Meningo plenty									1 in 100 to 1 in 600	1 in 800 to 1 in 3,200
											Isolation of Phage from Heart blood.	

CHART V

		Results in Streptococcic Septicæmia	Results in Staphylococcic Septicæmia	Results in Meningococcic Septicæmia
1	**Antibacterial Serum**	Good	Bad	Encouraging
2	**Antitoxic Serum**	Good	Good	Encouraging
3	**Antitoxic and Antibacterial Serum**	Best results	Good	Best results
4	**Sero-Vaccine**	Good in early cases	Not promising	Good in chronic cases
5	**Sensitised Vaccines of Besredka**	Not been sufficiently tried	Not been sufficiently tried	Not been sufficiently tried
6	**Toxoids and Vaccoids**	Moderate	Very good	Not been sufficiently tried
7	**Vaccines**	Good only in chronic cases	Bad	Not convincing in treatment, but has got prophylactic value
8	**Detoxicated Vaccines**	Bad	Bad	Bad
9	**Ecto-Antigens (Immunogens) etc.**	Bad	Encouraging	Bad
10	**Bacteriophage**	Bad		Altogether a new item. Too early to say anything—result promising in experimental animals
11	**Immuno-Transfusion**	Reported to be good Possibilities—Immense	Reported to be good Possibilities—Immense	Not tried
12	**Auto-Hæmotherapy**	Good results in chronic cases	Good results in chronic cases	Good results in chronic cases
13	**Foreign Protein Therapy**	Good	Bad	Not tried sufficiently

In conclusion, I want to emphasise that I have given you the opinions collected from practitioners in charge of different hospitals here and abroad, as well as the results of laboratory experiments. In collecting data for many items I had to depend upon figures given, entirely by foreign hospitals.

Read at a Clinical meeting of the Calcutta Branch, I. M. A. on 27th August, 1936.

REFERENCES

1. A. WADSWORTH—*Am. Jour. of Hygiene*, 14, 3, 1931.
2. (*a*) SEN, B. B.—*J. I. M. A.*, April, 1935.
(*b*) SEN, B. B.—*Antiseptic*, August, 1935.
(*c*) SEN, B. B.—*Journal of Bacteriology*, September, 1936.
3. *Medical Annual*, 1936.

CIRRHOSIS OF THE LIVER IN NORTHERN CIRCARS (SOUTH INDIA)

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(*Continued from the previous issue*)

HEPATIC FUNCTION TESTS AND CIRRHOSIS OF THE LIVER

The numerous tests designed from time to time to estimate hepatic function only indicate the difficulties encountered in its study and the unsatisfactory nature of the problem. The varied (pigmentary, metabolic, antitoxic, hæmopoietic, chromogogic, etc.) functions of the liver, the great reserve of the organ, the compensatory regeneration, especially in chronic parenchymal damage, and the dissociation of hepatic function in disease (one or more functions may be effected, the others remaining almost normal), are some of the factors which are responsible for the difficulties encountered in the estimation of hepatic function. Moreover, the varied and, at time, conflicting results obtained in the application of a particular test in similar pathological conditions of the liver, *e.g.* cirrhosis of the liver, also appear to be due to the above factors.

A study of the several hepatic functional tests and their value in hepatic diseases, is beyond the scope of this thesis. In the following pages the results of an investigation into the value of some of the important functional tests, enumerated below, are presented and briefly discussed:

(1) The Rose Bengal Test;
(2) The lævulose tolerance test;
(3) The galactose tolerance test (Bauer);
(4) The Van Den Bergh Reaction and,
(5) The Widal's hæmoclasic crisis.

Observations

(1) The Rose Bengal Test:

Principle: The liver is capable of absorbing from the blood and excreting into the bile (the so-called ' chromogogic ' function) some of the dyes, *e.g.* phenoltetrachlor-phthalein, bromsulphalein, Rose Bengal, bilirubin, etc., which may be present in the blood after oral or intravenous administration. As this function is dependent on the integrity of the hepatic parenchyma, retention of the dye after intravenous injection indicates damage to the hepatic parenchyma and consequent hepatic dysfunction.

Technique: About 10 c.c. of a one per cent. solution of Rose Bengal dye in saline was injected intravenously and samples of blood were collected at the end of the second and eighth minutes respectively from the start. Taking the two minutes sample as the standard (the maximum concentration of the dye is present in the blood at the end of second minute after intravenous injection), the amount of dye present in the blood (plasma) in the eight minutes sample was colorimetrically estimated (full details of the test are given in Appendix 17, p. 1012).

It has been shown (Epstein, Delprat and Kerr, 1927) that in eight minutes after injection 50 per cent. (varying from 40 to 60 per cent.) of the dye is removed from the blood by a healthy liver.

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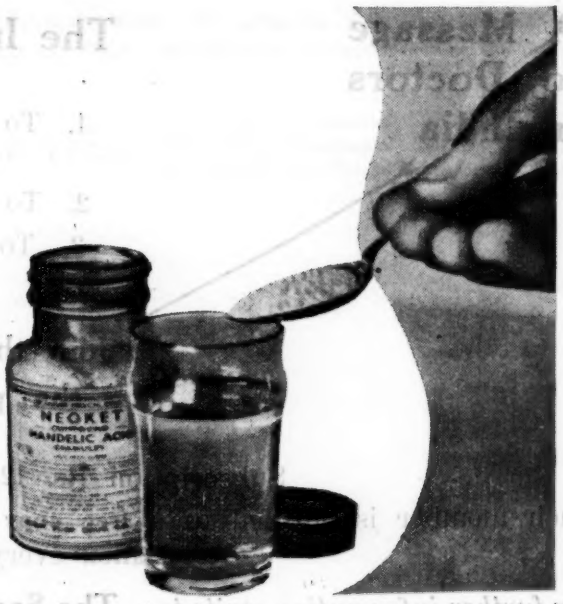

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Results: The results of the Rose Bengal dye excretion test in a series of unselected hospital patients are given in Appendix 17 (*vide* table, p. 1015); the following is a summary of the findings:

Serial No.	Disease.	No. of cases.	Marked retention of Rose Bengal.	Moderate retention of Rose Bengal.	Slight retention of Rose Bengal.	Normal excretion of Rose Bengal.
1.	Heart failure—ascites	7	...	1	5	1
2.	Chronic Nephritis—ascites	1	...	...	...	1
3.	Peritonitis—ascites:					
	(a) Chronic peritonitis	4	...	...	...	4
	(b) Tubercular peritonitis	1	...	...	1	...
	(c) Malignant peritonitis	1	...	...	...	1
4.	Jaundice—no ascites:					
	(a) Toxæmia of pregnancy	1	...	1	...	...
	(b) Avitaminosis and anæmia	1	...	1	...	...
	(c) Catarrhal jaundice	2	...	2	...	...
5.	Malignant disease of the liver—no ascites:					
	(a) Primary	1	1	...	...	...
	(b) Metastatic	1	...	...	...	1
6.	Secondary anæmia:					
	(a) Without ascites	7	...	...	3	4
	(b) With ascites [fatty degeneration of liver (?)]	1	1	...	...	...
7.	Cirrhosis of the liver:					
	(a) 'Biliary' cirrhosis—ascites	1	1	...	...	...
	(b) Portal cirrhosis—ascites	4	3	1	...	...
	(c) Syphilitic cirrhosis—no ascites	1	1	...	...	...

Thus, out of the 19 cases in which clinical evidences of hepatic disorder were present, marked retention of the dye was present in 7 cases, moderate retention in 6 cases, slight retention in 5 cases and normal excretion in one case; and, out of the 15 cases without evidences of hepatic disorder, marked retention of the dye was present in one case, slight retention in 4 cases and normal excretion in 10 cases.

Most cases of *decompensated cirrhosis of the liver* showed either marked or moderate retention of Rose Bengal dye (*vide* Appendix I, p. 406). The excretion of Rose Bengal in healthy controls was within the normal limits given by Epstein, Delprat and Kerr (1927).

Except a rigor or a rise of temperature in rare instances, no untoward symptoms were seen in any of the patients in the above series after intravenous injection of the dye. These observations are interesting, especially in view of the findings of Delprat and his co-workers (personal communication), who found cutaneous manifestations (erythema, soon developing into intense itching and later, considerable œdema with exfoliation of superficial layers of the skin) in areas exposed to either direct sunlight or brilliant diffuse day-light in patients (blondes) who had jaundice or marked retention of the dye. It may be mentioned here that the patients in this series were dark-skinned, and bright, diffuse sunlight is present almost throughout the year in the hospital wards, where all the patients were investigated.

The acetone precipitation method (Delprat and Stowe, 1931) gave clear solutions for colorimetric estimation of the dye; but, in some cases the extraction of the dye seemed to be imperfect and incomplete. In cases in which there was bilirubinæmia, the exact matching of the colours during the colorimetric estimation of the dye was found difficult, sometimes even after the addition of a few drops of sodium hydrate solution to the plasma.

Though the dye is supposed to be excreted entirely by the liver, there were few cases in this series (*vide* Appendix 17, p. 1032) in which the dye was, to a slight extent, also eliminated by the kidneys.

(2) The Lævulose Tolerance Test:

Principle: The liver is considered to be essential for the conversion of lævulose to glucose, before the former can be utilized by the tissues; and, following oral administration of lævulose, there is no appreciable rise in the blood sugar level. Hence, a hyperglycæmia due to an increase in the lævulose content of the blood, or a lævulosuria, when it exceeds the renal threshold for lævulose (0·115 to 0·13 gm. per

cent.—Tallerman, 1923), after the ingestion of lævulose is considered as indicative of hepatic disorder.

Technique: Under basal conditions, specimens of blood and urine were collected from the patients before and, every half-hour for two hours, after the oral administration of 30 to 50 gm. of lævulose (depending on the body weight of the patient) dissolved in water. The total sugar (glucose and lævulose) in the five specimens of blood was estimated by Folin and Wu's (1920) method in terms of glucose, as it has not been possible to estimate lævulose as such in the blood.

A rise of blood sugar above 135·0 mg. per cent., or a maximum rise of 30·0 mg. above the fasting level after the ingestion of lævulose is considered as indicative of derangement of hepatic function (Tallerman, 1923).

Results: The following is a summary of the results of the lævulose tolerance test obtained in a series of unselected hospital patients. Full details of the cases are given in Table I, Appendix 18. The following standards were adopted in interpreting the results: positive, if the maximum rise of blood sugar above the fasting level exceeded 30·0 mg. per cent.; negative, if it was below 20·0 mg. per cent.; and doubtful, if it was within these two readings, *i.e.* between 20 and 30 mg. per cent.

Serial No.	Disease.	No. of cases.	Positive.	Doubtful.	Negative.
1.	Jaundice:				
	(a) Catarrhal jaundice	5	1	2	...
	(b) Toxic jaundice	1	...	...	1
	(c) Jaundice and avitaminosis	1	1	...	...
	(d) Jaundice—malignant disease of the liver ...	2	2	...	...
2.	Cirrhosis of the liver:				
	(a) Portal cirrhosis—ascites	16	12	3	1
	(b) Syphilitic (?) cirrhosis—ascites	6	4	...	2
	(c) Syphilitic (?) cirrhosis—no ascites ...	2	1	1	...
	(d) 'Biliary' cirrhosis—ascites	1	1	...	...
	(e) 'Biliary' cirrhosis—no ascites	2	2	...	...
	(f) Capsular cirrhosis—ascites	1	1	...	...
3.	Secondary anæmia:				
	(a) with ascites	3	...	1	2
	(b) without ascites	1	...	...	1
4.	Heart failure—ascites	2	...	1	1
5.	Peritonitis-ascites:				
	(a) Chronic peritonitis	1	...	1	...
	(b) Tubercular peritonitis	1	...	...	1
	(c) Malignant peritonitis	1	1	...	...
6.	Chronic malaria (?)—no ascites	1	...	...	1

Thus, out of the 37 cases in which there was definite evidence of hepatic disorder, the test was positive in 25, doubtful in 7, and negative in 5 cases. The test was positive in 1, doubtful in 2, and negative in 5, out of the 8 cases in which evidence of hepatic disorder was absent.

Paradoxical results were obtained (probably due to glycolysis) when the earlier specimens of blood were left over till the end of the test period before the blood-sugar estimations were undertaken. This difficulty was obviated by preparing the protein-free filtrates of the specimens of blood as soon as they were taken from the patient.

In most of the positive cases, the concentration of blood sugar was at its maximum at the end of 1—1½ hour and it remained elevated even at the end of two hours, showing no tendency to return to the fasting level.

The urinary findings were very variable and hence are not considered here.

(3) The Galactose Tolerance Test (Bauer).

Principle: The principle of this test is similar to that of the above test. Following the ingestion of

40 gm. of pure galactose in a normal individual, there is no appreciable rise in the blood sugar level and little, if any, galactosuria. A hyperglycæmia due to an increase of galactose in the blood, or a marked galactosuria, following oral administration of galactose, are therefore considered to denote hepatic inefficiency. As there is no renal threshold for galactose (Folin and Berglund; Harding and Van Nostrand, quoted by Shay; Shay, Schloss, and Bell, 1931; Rowe and Chandler, 1924), any rise in the concentration of sugar in the blood due to galactose results in galactosuria and hence the urinary findings even by themselves are considered to be of diagnostic importance in the study of hepatic disorders.

Technique: Under basal conditions the patients were given 40 gm. of galactose dissolved in 15 ounces of water and the urine was collected every hour during the five-hour period following the administration. Each specimen of urine was qualitatively examined for sugar; the positive specimens were mixed and the total galactose excreted in the urine during the five-hour period was quantitatively estimated by Benedict's method (Full details of the test are given in Appendix 18, p. 143).

An output of more than 2·0 gm. of galactose in the five-hour period following the administration of 40 gm. of galactose is considered as indicative of impaired hepatic function (Bauer; Davies, 1927).

Results: The galactose tolerance test gave variable results in some typical cases, both in the acute and chronic disorders of the liver (*vide*, Appendix 18, Table II, p. 154). Thus, in two cases of toxic jaundice, the test was positive in one and negative in the other; out of the 7 cases of cirrhosis of the liver, the test was positive in 3 and negative in 4. In the 9 cases which showed clinical evidences of chronic hepatic disorder the test was positive only in 3 cases. The test was negative in a case of jaundice due to secondary malignant deposits in the liver.

On account of the oliguria present in cases of cirrhosis of the liver, the qualitative examination for sugar in the hourly specimens (sometimes containing only a few c.c. of urine), after the administration of galactose, was omitted; instead, all the specimens were mixed, the resulting mixture was qualitatively tested for sugar and, if positive, the amount of galactose was quantitatively estimated.

In the quantitative estimation of galactose in urine, the galactose-equivalent of 25 c.c. of Benedict's quantitative solution was first determined by using a standard solution of pure galactose (Kahlbaum).

(4) THE VAN DEN BERGH REACTION:

Principle: A detailed discussion of the theoretical principles underlying the use of the different types of Van Den Bergh reaction is beyond the scope of the present thesis, as it leads to a consideration of the metabolism of bile pigments and the modern conception of jaundice. Briefly stated, bilirubin is formed from hæmoglobin (set free in the general circulation by the destruction of red blood cells) by the cells of the reticulo-endothelial system, mainly outside of the liver in the bone-marrow and spleen, and is excreted by the cells of the hepatic parenchyma. Van Den Bergh (1918) found that the bilirubin which has passed through the hepatic parenchymal cells was different from that which has not passed through the parenchymal cells of the liver in its chemical reaction with Ehrlich's diazo reagent; the former gave an "immediate" reaction, the latter a "delayed" reaction. Thus, obstructive jaundice gives a "direct" reaction, as the bilirubin in the serum is of the variety which has passed through the cells of the hepatic parenchyma; hæmolytic jaundice gives a "delayed" or an "indirect" reaction, as the serum contains only that type of bilirubin which has not been transmitted through the cells of the hepatic parenchyma; and toxic jaundice gives a "biphasic" reaction due to the presence, in the serum, of both types of bilirubin.

Technique: The modified technique of McNee and Keefer (described by Beaumont and Dodds, 1929) was followed in performing the reaction during this investigation.

To avoid hæmolysis, syringes used in the collection of blood were sterilized in liquid paraffin. The specimens of blood were collected in oxalated tubes and the examination was made soon after taking the blood.

As only a few specimens were examined at a time, 10 c.c. of solution A and 0·3 c.c. of solution B were used in preparing the fresh solution of the Ehrlich's diazo reagent. Solution B was found to deteriorate on standing and hence a fresh solution was made every week.

Results: The Van Den Bergh reaction was performed in most patients during the investigations

into ascites (Appendix 13), decompensated portal cirrhosis (Appendix 1), Rose Bengal test (Appendix 17, Table) and lævulose tolerance test (Appendix 18, Table I). The following is a summary of the findings in the cases in which the test was performed in the course of the latter two investigations:

In a series of 64 cases of decompensated portal cirrhosis, only six of which showed ' overt jaundice,' the Van Den Bergh reaction was as follows:—

(a) Direct—

(1) Immediate 8·2 per cent.

(2) Biphasic 12·3 per cent.

(3) Delayed 61·0 per cent.

(b) Indirect only 11·0 per cent.

(c) Negative 7·5 per cent.

Thus in most cases of portal cirrhosis in which no evidences of jaundice were manifest clinically, the Van Den Bergh reaction showed a 'latent' jaundice. Most cases of deep jaundice, irrespective of their type, gave an "immediate" reaction, although clinical evidences of biliary obstruction were not present. In the cases in which the jaundice was slight or insignificant, the Van Den Bergh reaction often gave a "delayed" reaction.

In some of the anæmic sera, which gave a faint delayed reaction or a faint indirect reaction, the resulting mixture after the addition of the diazo reagent, alcohol and saturated ammonium sulphate solution (in performing the indirect reaction) formed into a gel. The exact significance of this gel-formation, however, is not clear.

The results of the qualitative examination of the urine for bile pigments, bile salts, urobilin, etc., in cases of cirrhosis of the liver have already been given in the previous chapter.

(5) The Widal's Hæmoclasic Crisis:

Principle: The hæmoclasic crisis is believed to be of the nature of an anaphylactic blood reaction due to the passage of partially digested proteins from the gastro-intestinal tract into the systemic circulation, when the liver is diseased (Widal, Abrami and Iancovesco, 1920). The normal post-prandial leucocytosis is not seen in such cases, or it may even be replaced by a leucopenia, accompanied by a fall of blood pressure.

Technique: White blood-cell counts were made before, and twenty and forty minutes after, the oral administration of 7 oz. of milk to the patients on a fasting stomach.

A rise in the total white-cell count of 3,000 per c.mm., at the end of twenty or forty minutes after the administration of milk, is considered as indicative of good hepatic efficiency; a rise below 2,000 per c.mm. or a leucopenia is considered as indicative of impaired hepatic function; the hepatic function is considered doubtful, if the rise is above 2,000, but below 3,000 per c.mm.

Serial No.	Disease.	Number of cases.	*V. D. B. direct immediate.	V. D. B. direct biphasic.	V. D. B. direct delayed.	V. D. B. indirect only (direct negative.)	V. D. B. negative.
1.	Jaundice:						
	(a) Catarrhal jaundice	3	3	...	...	...	...
	(b) Toxic jaundice	1	1	...	...	...	...
	(c) Avitaminosis jaundice ...	1	1	...	...	...	...
	(d) Malignant disease of the liver ...	2	1	1	...	...	...
2.	Cirrhosis of the liver:						
	(a) Portal cirrhosis	15	2	3	8	...	2
	(b) ' Biliary ' cirrhosis	3	3	...	...	...	...
	(c) Syphilitic (?) cirrhosis ...	8	2	1	3	1	1
	(d) Capsular cirrhosis	1	...	...	...	1	...
3.	Secondary anæmia:	7	...	...	4	1	2
4.	Peritonitis	5	...	...	1	1	3
5.	Heart failure	5	...	...	1	2	2
6.	Chronic malaria (?)	1	...	1	...	...	...

*V. D. B. = Van Den Bergh reaction.

Results: The following is a summary of the results of the Widal's test in a series of 22 cases of ascites, the details of which are given in Appendix 13 (Table II, p. 464):

The results of the Widal's test in most of these cases were found to compare favourably with the other functional tests in the estimation of hepatic efficiency.

Serial No.	Cause of ascites.	No. of cases.	Hepatic efficiency-good.	Hepatic efficiency-doubtful.	Hepatic efficiency-impaired.
1.	Extreme anæmia	3	3	...	...
2.	Heart failure	1	...	...	1
3.	Chronic peritonitis	1	1	...	...
4.	Cirrhosis of the liver	17	2	4	11

Discussion

(1) The Rose Bengal Test:

The results of the Rose Bengal dye test show that varying degrees of retention of the dye, depending on the damage of the hepatic parenchyma, were seen in disorders of the liver, both acute and chronic; and the test is an useful aid in the diagnosis of hepatic disorders. As the test depends on the functional integrity of the hepatic parenchyma, it is more likely to be positive in hepatic disorders involving diffuse parenchymal damage, rather than in localized affections. The nature of the lesion responsible for the parenchymal damage, however, is not indicated by the result of this test taken by itself.

While the marked retention of the dye in cases of cirrhosis of the liver is no doubt mainly due to the parenchymal damage, other factors, *e.g.* lack of connection of the regenerated nodules with the bile channels (Althausen, 1931), and delayed presentation of the dye to the hepatic parenchyma (by the hepatic arterial blood) on account of the loss of normal pattern of the hepatic parachyma in cirrhosis (Mc Indore, 1927), probably also contribute to this retention of the dye; the anæmia with which most of the cases were associated in the later stages of the disease does not in any way contribute to this retention. The marked retention of the dye in cases of portal cirrhosis is usually associated with only a latent bilirubinæmia and this feature may aid in the diagnosis of this type of cirrhosis. As retention of the dye is almost a constant feature in cirrhosis of the liver, the test is of value in differentiating ascites due to this cause from other conditions (cardiac decompensation, nephritis, chronic, tubercular or malignant peritonitis, etc.), producing ascites, as in the latter the dye excretion is normal or the retention, if evident, is only slight. In cases of portal cirrhosis, the degree of retention of the dye does not, however, seem to depend on the degree or duration of ascites.

The degree of retention of the dye appears to be of no prognostic significance, as it only indicates the degree of parenchymal damage and the subsequent prognosis depends on several other factors, *e.g.* the nature and duration of the lesion, the causative factors, response to treatment, capacity for regeneration, presence or absence of other complications, etc. One of the patients in this series—a case of cirrhosis of the liver—in spite of showing a normal dye excretion, died the next day due to a fatal hæmatemesis. Moreover, an inpairment of the 'chromogogic' function does not necessarily indicate an involvement, to the same extent, of the other functions of the liver; a small amount of actively functioning hepatic tissue is sufficient to maintain the vital functions of the liver in an almost normal manner. Hence it is suggested that no useful purpose is served in calculating the 'percentage of liver function,' from the percentage of dye present in the blood at the end of eight minutes, by the formula given by Delprat and Stowe (1931); the retention of the dye, if evident, should simply be classified as slight, moderate or marked, so as to denote only the 'chromogogic function' of the liver.

The cutaneous complications (already referred to) reported to be present, by Delprat and his co-workers, in their cases with marked retention of the dye or jaundice, are attributed to the photosensitizing effect of Rose Bengal on the tissues; the absence of such complications in any of the patients in this series is probably due to the protective filtration of the actinic rays of the sun by the dark pigment present in the skin of the patients.

The experience of Delprat and his co-workers (personal communication; also Stowe, Delprat and

Weeks, 1933) with the six halogen dye (di-iod-tetra-chlor-fluorescein) used in the present investigation, and showed that it (the dye) " spilled over " to a slight extent in the urine of jaundiced patients; hence, they now recommend the use of an eight halogen-atom dye (disodium-tetraiodo-tetrachlor-fluorescein) instead of the one with six halogen atoms.

The uniform retention of the dye in cases of cirrhosis of the liver, though not specific for this disease, still aids in the diagnosis of this condition from other hepatic disorders, especially when this finding is taken in conjunction with the clinical and other laboratory findings.

(2) The Lævulose Tolerance Test:

The importance of the lævulose tolerance test in the diagnosis of hepatic disorders has been the subject of much discussion in the recent literature; opinion regarding its reliability as a hepatic functional test is by no means unanimous. Thus, while Tallerman (1923), Covell (1923), Finkelstein and Dannenberg (1925), King (1927), Hurst (1931), Spence and Brett (1921), and others considered that the lævulose tolerance test is a very useful aid in the diagnosis of hepatic disorders and in determining hepatic efficiency, Greene, Snell and Walters (1925), Harris (1932), Rowntree, Marshall and Chesney (1914), Greene, McVicar, Snell and Rowntree (1927), among others have pointed out the unsatisfactory nature of the test. The results of the present investigation showed that a positive lævulose tolerance test is not an invariable finding in all cases of hepatic disorder (only 25 out of 37 such cases giving a positive result), and a negative test did not always exclude hepatic disorder.

The unsatisfactory nature of the test in cases of cirrhosis of the liver pointed out by Rowntree, Marshall and Chesney (1914) and Greene, McVicar, Snell and Rowntree (1927), is borne out by the results of this investigation. While most cases (21 out of 28 cases) of cirrhosis of the liver gave positive tests, the others, in which definite evidences of the disease were also present, gave only doubtful or negative results.

The discrepancies in the results of the lævulose tolerance test in hepatic disorders in general and in cirrhosis in particular are probably to some extent due to the variations in the reserve of the organ and its capacity for regeneration; besides, variations in the rate of absorption of lævulose from the intestines and in the rate of its elimination by the kidneys may also be responsible for the variations in the results. As a small amount of hepatic tissue is sufficient for maintaining the important functions of the liver (Mann and Bollman, 1931), lævulose tolerance tests may be expected to be positive only when there is diffuse destruction of the entire hepatic parenchyma, either acute or chronic, and when there is failure of regeneration in chronic cases.

The results of the present investigation show that a positive lævulose tolerance test is generally indicative of hepatic dysfunction and a negative test is of no significance, as it (negative test) is found not only in normal cases, but also in cases of hepatic disorder in which a sufficient amount of actively functioning hepatic tissue is still present to maintain the carbohydrate metabolism. These findings, together with the positive results obtained in some cases in which evidences of hepatic disorder were absent, favour the conclusion that the test cannot be regarded as a reliable diagnostic aid in the study of hepatic disease. Moreover, the blood sugar curves, the maximum concentration of blood sugar, and the maximum rise of blood sugar over the fasting level in the lævulose tolerance tests were very variable and did not appear to be proportional to the degree of hepatic damage, hence, a positive lævulose tolerance test, apart from giving an indication of hepatic dysfunction, does not permit of a quantitative estimation of hepatic efficiency.

The experimental work of Mann and Bollman (1931), showing that in hepatectomized dogs lævulose can completely be utilized by its conversion to glucose in the intestines, and of Mann (quoted by Peters and Van Slyke, 1931), that the muscles can also form glycogen from lævulose, no doubt raises serious doubts as to the specific nature of the lævulose tolerance test for estimating hepatic efficiency.

(3) The Galactose Tolerance Test (Bauer):

Though the principles underlying the use of galactose in hepatic function tests (Shay, Schloss, and Bell, 1931; Shay, 1935; Bollman, Power, and Mann, 1931) would indicate that the galactose tolerance test is the method of choice for the estimation of hepatic efficiency and in the differential diagnosis of jaundice, clinical application of the test has been productive of variable results. The factors which are responsible for the discrepancies in the lævulose tolerance test (discussed above) evidently appear to be also responsible for these varied results in the galactose tolerance test.

The rarity of positive galactose tolerance tests in patients with cirrhosis of the liver reported by Rose and Schwartzman (1933), Schiff and Senior (1934), Wagner (1914), and Banks, Sprague and Snell (1933), is also borne out by the results of the present investigation. Bode (1931) found marked increase in the blood sugar but no galactosuria after the administration of galactose in his patients with cirrhosis of the liver; this finding was thought to be due to the increased renal threshold for galactose. Whether this finding (increased renal threshold for galactose) is in any way responsible, apart from the other factors already discussed, for the frequency of negative tests in chronic hepatic disorders, especially cirrhosis of the liver, deserves further consideration. The oliguria present in most cases of cirrhosis of the liver may also be responsible for a delay in the excretion of galactose and the consequent low concentration of urinary galactose in the five-hour period following the ingestion of the sugar.

Most observers (Shay, Schloss and Rodis, 1931; Shay and Schloss, 1932; Bauer, 1908 and 1932; Schiff and Senior, 1934; Roe and Schwartzman, 1933; Shay, 1934; Dodds, 1931; Davies, 1927; and others) have agreed that the test is a valuable aid in the differential diagnosis of jaundice, especially in identifying cases of intrahepatic jaundice (toxic or infectious) from those of the obstructive type, as in the former there is an acute and diffuse involvement of the hepatic parenchyma, while in uncomplicated cases of the latter there is no such destruction. But, on account of the negative results which may be given by the galactose test in cases of intrahepatic jaundice of long duration and in convalescing cases of infectious jaundice (Eusterman, 1932), and the positive results in some cases of mechanical obstructive jaundice (Eustermann, 1932; Banks, Sprague and Snell, (1933) and in cases of obstructive jaundice of long duration (Shay, 1934; Bode, 1931), it may be accepted that the test is an useful aid in the differential diagnosis of cases of only early jaundice.

The galactose tolerance test (Bauer) is a simple one and can often be repeated in the same case to follow progress without much discomfort to the patient. But the urinary galactose concentration following the ingestion of galactose appears to be very variable, as some cases in which the blood and urine concentrations of galactose were simultaneously estimated showed a marked rise in the former without galactosuria (Elmer and Scheps, 1928 and 1930; Bode, 1931). The uncertainty of the urinary findings (Davies, 1927; Kahler and Machold, 1922; Elmer and Scheps, 1928), and the importance of the blood sugar values (Kahler and Machold, 1922; Davies, 1927; Rolleston and McNee, 1929; Elmer and Scheps, 1930; Dodds, 1931; Bode, 1931; Roe and Schwartzman, 1933; and others) in the galactose tolerance test for studying the carbohydrate metabolism in hepatic disease, indicate that more reliable information would be obtained by a simultaneous estimation of blood sugar (glucose and galactose) every half an hour, during the two-hour period, and the urinary galactose in the five-hour period following the ingestion of galactose, than by the latter method alone.

A positive galactose tolerance test appears to be strong evidence in favour of hepatic parenchymal damage. The test is likely to be positive in acute hepatic disorders involving diffuse destruction of parenchyma and in chronic cases, *e.g.*, cirrhosis, which show, in addition to diffuse parenchymal damage, failure of regeneration. The type of parenchymal damage which is responsible for the positive galactose tolerance test, however, cannot always easily be decided from the results of this test alone.

(4) THE VAN DEN BERGH REACTION:

While it is generally considered that the introduction of the Van Den Bergh's reaction has greatly advanced our knowledge regarding the mechanism of jaundice, opinion is divided as to its clinical importance in the differential diagnosis of jaundice. The clinical application of the test in the differential diagnosis of jaundice is very unsatisfactory (Andrewes, quoted by Langdon Brown, 1923; Dodds, 1931; and others), and, as pointed out by Dodds (1931), the problem reduces itself to a quantitative one; a large quantity of bile pigment in the serum gives an immediate direct reaction, while a small quantity gives a delayed reaction. As most cases of jaundice in the present series which gave a direct immediate Van Den Bergh reaction showed no evidences of biliary obstruction, it is incorrect to conclude that a direct immediate reaction is indicative of obstructive jaundice alone.

The test (quantitative reaction) is useful in following the progress of jaundice and has the advantage over the much simpler icteric index, in that it is a specific test for bilirubin and is uninfluenced by carotin and other pigments which may be present in

the blood. The test is very valuable in the detection of 'latent jaundice.'

The value of the Van Den Bergh reaction in the estimation of hepatic efficiency is very limited. While an increased concentration of bilirubin in the blood, in the absence of hæmolytic disease, is strongly in favour of hepatic dysfunction (Rozendaal, Comfort and Snell, 1935), the degree of its concentration is not always proportional to the hepatic injury. Moreover, most cases of portal cirrhosis which showed clinical and laboratory evidences of hepatic insufficiency showed only a latent bilirubinæmia. Neither a qualitative nor a quantitative Van Den Bergh reaction can therefore give an estimate of hepatic efficiency, apart from an indication of the extent of impairment of the biliary excretion.

As pointed out in previous chapter, urobilinuria, in the absence of hæmolytic disease and biliary obstruction with infection, is strongly in favour of hepatic dysfunction; but as a measure of hepatic efficiency, it merits little consideration. Similarly, the presence of bile pigments in the urine and fæces, apart from giving an indication of the intensity of jaundice and the degree of biliary obstruction, fail to assess hepatic function.

(5) The Widal's Hæmoclasic Crisis:

The theoretical principles underlying the use of the hæmoclasic crisis as a test of hepatic efficiency are disputed on account of the marked variations of the leucocytic count under normal conditions (Shaw, 1925; Mauriac and Cabouat, 1921; Servantie, Panzat and Monod, 1921; Kobryner, 1924; Goodman and Connery, 1930), the normal physiological rhythm of the leucocytes approximately every hour irrespective of digestion (Sabin, Cunningham, Doan and Kindwall, 1925; Shaw, 1927), and the absence of a post-prandial leucocytosis in some cases (Storm Van Leeuwen, Bien and Varekamp, 1922). Moreover, leucocytic rhythms similar to those found normally have been reported to occur also in many types of disease (Doan and Zerfas, 1927), and a post-prandial leucopenia has been observed in asthma (Storm Van Leeuwen, Bien and Varekamp, 1922). Hence it is considered that the fall in leucocytes which may occur after the ingestion of a meal is not specific to hepatic disease and is probably only a phase of depression in the physiological rhythm of the leucocytes.

Wilson (1922), and Bose and Banerji (1929) found the test reliable in assessing hepatic function. On the other hand, Goodman and Connery (1930) pointed out that there is no evidence to show that the hæmoclasic crisis is a test for hepatic function, and the ingestion of milk had no effect on the leucocytes in the peripheral blood during a two hour period.

Though the results of the test in most patients in the present series compared favourably with those of the other hepatic function tests, it is difficult to be sure, on account of the controversy regarding the principles underlying its use, that the test could be regarded as indicative of the hepatic proteopexic function and a measure of hepatic efficiency.

It is evident from the above study that hepatic functional tests in cirrhosis of the liver depend on the extent of parenchymal destruction and impairment of biliary excretion; with the exception of the rose bengal dye excretion test, the results of the functional tests in hepatic disorders, especially in cirrhosis, were very variable.

Apart from giving an indication of impaired hepatic function, positive hepatic functional tests do not appear to permit of a quantitative estimation of the function of the liver. Application of two or more tests is sometimes useful in the diagnosis of the nature of morbid process in the liver, *e.g.*, a marked retention of the dye with a latent bilirubinæmia is in favour of portal cirrhosis, while a retention of the dye with a positive galactose test in a case of early jaundice is very suggestive of toxic or infective jaundice; but it also fails to estimate quantitatively hepatic function. (Mann, 1934). Moreover, on account of the dissociation of hepatic function in disease (Mann, 1934), it is misleading to judge the function of the liver from the result of a single functional test.

On the whole, it appears that attempts at the quantitative estimation of hepatic function, either in the diagnosis or in assessing the prognosis of hepatic disorders, have met with very little success so far.

Summary and Conclusions

An investigation into the clinical value of some of the important hepatic functional tests showed that:

(1) The Rose Bengal dye excretion test is reliable in the diagnosis of hepatic disorders;

(2) The lævulose tolerance test cannot be regarded as a reliable diagnostic aid in the study of hepatic diseases;

(3) The galactose tolerance test is useful in the differential diagnosis of cases of early jaundice; but in chronic hepatic disorders the test appears to be unsatisfactory. Following the ingestion of galactose, the blood sugar concentration appears to be more reliable than the urinary concentration of galactose in the diagnosis of hepatic disorders;

(4) Clinically, the Van Den Bergh reaction is of very little value in the differential diagnosis of jaundice. Apart from an indication of the extent of impairment of biliary excretion, the test is of little practical importance as an hepatic efficiency test. In the absence of hæmolytic disease, an increased concentration of bilirubin in blood is suggestive of hepatic dysfunction; and

(5) The Widal's hæmoclasic crisis is of doubtful value in the diagnosis of hepatic disorders.

With the exception of the Rose Bengal dye excretion test, the hepatic functional tests gave variable results in cases of cirrhosis of the liver. Positive hepatic functional tests, while indicative of hepatic dysfunction, do not appear to permit of a quantitative estimation of the function of the liver. Moreover, it is misleading to judge hepatic function from the result of a single functional test on account of the dissociation of hepatic function in disease.

REFERENCES

1. Adler, A., and Lemmel, H. (1927-28)—*D. Arch. Klin. Med.*, Vol. 158, p. 173.
2. Althausen, T. L. (1931)—*Arch. Int. Med.*, Vol. 48, p. 667.
3. Althausen, T. L., and Thoenes, E. (1932)—*Arch. Int. Med.*, Vol. 50, No. 1, p. 58.
4. Andrewes—Quoted by Langdon Brown.
5. Bang, Ivar (1915-16)—*V. Biochem. Z.*, Vol. 72, p. 146 (Quoted by Peters and VanSlyke, p. 291).
6. Banks, B. M., Sprague, P. H., and Snell, A. M. (1913)—*Jour. Amer. Med. Assoc.*, Vol. 100, No. 25, p. 1987.
7. Bauer, R. (1906)—*Wien Med. Wchnschr.*, Vol. 56, pp. 20 and 2537; *Deutsche Med. Wchnschr.*, Vol. 24, p. 1505 (1908); *Wein. Klin. Wchnschr.*, Vol. 25, p. 939 (1912); *Wiener Arch. fur innere Medezin*, Vol. 6, p. 9 (1923); *Wien Klin. Wchnschr.*, Vol. 45, p. 1577 (1932).
8. Beaumont, G. E. and Dodds, E. C. (1929)—'Recent Advances in Medicine,' 5th ed., p. 154.
9. Beaumont, G. E., and Dodds, E. C. (1929)—'Recent Advances in Medicine,' 5th ed., p. 356.
10. Becher, E., and Litzner, S. (1926)—*Klin. Woch.*, Vol. 5, p. 147.
11. Benedict, S. R., and Newton, E. B. (1928)—*Jour. Biol. Chem.*, Vol. 76, p. 457; *Ibid*, Vol. 83, No. 2, p. 361 (1929).
12. Benedict, S. R. (1931)—*Jour. Biol. Chem.*, Vol. 92, pp. 135 and 141.
13. Best, J. W. (1919)—*Chem. Abst.*, Vol. 13, p. 2699; and *Arch. Physiol. Neerland*, Vol. 3, p. 222.
14. Bhatia, S. I. (1927)—*Trans. 7th Congress, F. E. A. T. M., Calcutta*, Vol. 1, p. 143.
15. Burger, M., and Beumer, H. (1931)—*Berl. Klin. Woch.*, Vol. 50, p. 112.
16. Bloor, W. R. (1916)—*Jour. Biol. Chem.*, Vol. 25, p. 577.
17. Bloor, W. R., and Knudson, A. (1917)—*Jour. Biol. Chem.*, Vol. 29, p. 7.
18. Bock, C., and Hoffman, F. A. (1874)—'Experimentalstudien uber Diabetis.'
19. Bode, O. B. (1931)—*Deutsches Archiv fur Klinische Medizin*, Berlin, Vol. 170, p. 165. (Abstract in *Jour. Amer. Med. Assoc.*, Vol. 96, p. 2168).
20. Bollman, J. L., Mann, F. C., and Magath, T. B. (1924)—*Amer. Jour. Physiol.*, Vol. 69, p. 371; *Ibid*, Vol. 78, p. 258 (1926).
21. Bollman, J. L., Mann, F. C., and Magath, T. B. (1925)—*Amer. Jour. Physiol*, Vol. 72, p. 629.
22. Bollman, J. L., and Mann, F. C. (1930)—*Amer. Jour. Physiol.*, Vol. 92, p. 92.
23. Bollman, J. L., Power, M. H., and Mann, F. C. (1931)—*Proc. Staff Meet., Mayo Clin.*, Vol. 6, p. 724 (Dec., 1931).
24. Bordley III, J. (1930)—*Bull. Johns Hopkins Hosp.*, Vol. 47, p. 113.
25. Bose, A. N., and Banerji, B. N. (1929)—*Ind. Jour. Med. Res.*, Vol. 16, p. 664
26. Brahmachari, and Sen (1925)—*Ind. Jour. Med Res.*, Vol. 13, p. 271; *Ibid*. p. 751.
27. Breed, L. M., and Rendall, J. (1923)—*Ann. Clin. Med., Balt.*, Vol. 2, p. 105 (quoted by Peters and Van Slyke, p. 292).
28. Brown, L. (1923)—*Brit. Med. Jour.*, Vol. 1, p. 461 (quoted by Beaumont and Dodds).
29. Burian, R. and Schur, H. (1910)—*Pfluger's Arch.*, Vol. 87, p. 239 (quoted by Peters and Van Slyke, p. 431).
30. Cammidge, P. J. (1928)—*Brit. Med. Jour.*, Vol. 2, p. 738; *Ibid.*, Vol. 1, p. 818 (1930).
31. Chauffard (1911)—*Rev. de. Med.*, Vol. 31, p. 176.
32. Chauffard, Laroche, and Grigaut (1920)—*Ann. de. Med.*, Vol. 8, p. 69.
33. Chapman, C. B., Snell, A. M., and Rowntree, L. G. (1931)—*Jour. Amer. Med. Assoc.*, Vol. 97, No. 4, p. 237.

34. COVELL (1923)—*Guy's Hosp. Rep.*, Vol. 73, p. 354 (quoted by King).

35. CRAWFORD, W. H. (1931)—*Amer. Jour. Med. Sci.*, Vol. 181, p. 496.

36. DAVIES, D. T. (1927)—*Lancet*, Vol. 1, p. 380.

37. DELPRAT, G. D., and STOWE, W. P. (1931)—*Jour. Lab. and Clin. Med.*, Vol. 16, No. 9, p. 923.

38. DELPRAT, G. D. (1933)—*Personal communication.*

39. DENIS, W. (1917)—*Jour. Biol. Chem.*, Vol. 29, p. 93.

40. DE WESSELOW, O. L. V. (1924)—'The Chemistry of the Blood in Clinical Medicine,' p. 196.

41. DOAN, C. A., and ZERFAS, L. G. (1927)—*Jour. Exper. Med.*, Vol. 46, p. 511.

42. DODDS, E. C. (1931)—*Lancet*, Vol. ii, p. 1228 (Dec. 5, 1931).

43. ELMER, A. W., and SCHEPS, M. (1928)—*Klin. Woch.*, Vol. 23, p. 1083; and *Lancet*, Vol. 2, p. 187 (1930).

44. EPSTEIN, N. N., DELPRAT, G. D. and KERR, W. J. (1927)—*Jour. Amer. Med. Assoc.*, Vol. 88, No. 21, p. 1619.

45. EPSTEIN, E. Z. (1932)—*Arch. Int. Med.*, Vol. 50, No. 2, p. 203.

46. EUSTERMAN, G. B. (1932)—Discussion on Robertson, Swalm and Konzelmann's Paper on functional capacity of the liver, *Jour. Amer. Med. Assoc.*, Vol. 99, No. 25, p. 2071.

47. EVERETT, M. R., and SHEPPARD, F. (1928)—*Jour. Biol. Chem.*, Vol. 80, p. 255.

48. FINKELSTEIN and DANNENBERG (1925)—*Jour. Lab. Clin. Med.*, Vol. 10, p. 522.

49. FOLIN, O., and WU, H. (1920)—*Jour. Biol. Chem.*, Vol. 41 p. 367.

50. FOLIN, O. and WU, H. (1923)—'Laboratory Manual of Biological Chemistry,' p. 253. D. Appleton and Co., London.

51. FOLIN and BERGLUND—Quoted by Shay, 1935.

52. FONTES, G., and THIVOLLE, L. (1929 and 1930)—*Bull. Soc. Chimie Biol.*, vi, vii, viii, ix, Vol. 12, pp. 264, 270, 278, 283. Also, i, ii, iii, *Ibid*, Vol. ii, pp. 146, 152, 159 (1929). Quoted by Pickard *et all*, 1932.

53. FOSTER, C. S., KAHN, M. (1916-1917)—*Jour. Lab. Clin. Med.*, Vol. 2, p. 25.

54. FRIEDENSON, M., ROSENBAUM, M. K., THALHEIMER, E. J., and PETERS, J. P. (1928)—*Jour. Biol. Chem.*, Vol. 80, p. 269.

55. FRIEDMAN, J. C., and STROUSE, SOLOMON. (1914)—*Arch. Int. Med.*, Vol. 14, p. 531.

56. GERRARD, W. J. (1926)—*Jour. R. N. Med. Serv.*, Vol. 12, p. 206 (quoted by Rolleston and McNee, p. 73).

57. GOODMAN, M., and CONNERY, J. E. (1930)—*Arch. Int. Med.*, Vol. 46, p. 1018.

58. GREENE, C. H., SNELL, A. M., and WALTERS, W. (1925)—*Arch. Int. Med.*, Vol. 36, p. 248.

59. GREENE, C. H., MCVICAR, C. S., SNELL, A. M., and ROWNTREE, L. G. (1927)—*Arch. Int. Med.*, Vol. 40, p. 159.

60. HARDING and VAN NOSTRAND—Quoted by Shay, 1935.

61. HARRIS, H. A. (1932)—*Brit. Med. Jour.*, No. 3745, p. 707 (Oct. 15, 1932).

62. HEINSBERG (1895)—Quoted by Peters and Van Slyke, p. 190.

63. HELMREICH, E., and WAGNER, R. (1925)—*Z. ges. exp. Med.*, Vol. 45, p. 490.

64. HILLER, A., LINDER, G. C., and SLYKE, D. D. (1925)—*Jour. Biol. Chem.*, Vol. 64, p. 625.

65. HOLDEN, H. F. (1925)—*Biochem. Jour.*, Vol. 19, p. 727.

66. HOPKINS, F. G., and DIXON, M. (1922)—*Jour. Biol. Chem.*, Vol. 54, p. 527.

67. HOPKINS, F. G. (1925)—*Biochem. Jour.*, Vol. 19, p. 787; *Jour. Biol. Chem.*, Vol. 84, p. 269 (1929).

68. HUGHES, T. A., and SHRIVASTAVA (1927)—*Ind. Jour. Med. Res.*, Vol. 15, p. 427.

69. HURST, A. F. (1931)—*Lancet*, Vol. 2, p. 1238.

70. KAHLER, H. and MACHOLD, K. (1922)—*Wien. Klin. Wchnschr.*, No. 18, p. 414 (quoted by Davies).

71. KING, G. (1927)—*Lancet*, Vol. 1, p. 385.

72. KLEIN, W., and DINKIN, L. (1914)—*Z. Physiol. Chem.*, Vol. 92, p. 302 (quoted by Peters and Van Slyke).

73. KLINKERT, D. (1913)—*Berl. Klin. Woch.*, Vol. 50, p. 820.

74. KOBRYNER, A. (1924)—*Compt, rend. Soc. de biol.*, Vol. 90, p. 1475.

75. LANGSTON, W. (1922)—*Jour. Lab. Clin. Med.*, Vol. 7, p. 293.

76. LEWIS, H. B., and IZUME, S. (1926)—*Jour. Biol. Chem.*, Vol. 71, p. 33.

77. MACINTOSH, R. M. (1927)—*Amer. Jour. Dis. Child.*, Vol. 34, p. 595.

78. MANN, F. C.—Quoted by Peters and Van Slyke, pp. 182, and 190.

79. MANN, F. C., and MAGATH, T. B. (1922)—*Arch. Int. Med.* Vol. 30, p. 73; Vol. 30, p. 171; Vol. 31, p. 797 (1923); and *Amer. Jour. Physiol.*, Vol. 65, p. 403 (1923).

80. MANN, F. C. (1925)—*Trans. Assoc. Am. Physicians*, Vol. 40, p. 362; and *Jour. Amer. Med. Assoc.*, Vol. 85, p. 1472.

81. MANN, F. C., and BOLLMAN, J. L. (1926)—*Arch. Path and Lab. Med.*, Vol. 1, p. 681.

82. MANN, F. C., and BOLLMAN, J. L. (1931)—'Comptes Rendus De La Premiere Conference Internationale De Pathologie Geographique,' Geneve, p. 190.

83. MANN, F. C. (1934)—*Jour. Amer Med. Assoc.*, Vol. 103, No. 25, p. 1930.

84. MAURIAC, P., and CABOUAT, P. (1921)—*Paris Med.*, Vol. 11, p. 407.

85. MARANON, G. (1930)—*Presse Med.*, Vol. 2, p. 1765.

86. MCCAY, BANERJI, GHOSAL, DUTT and ROY (1916 and 1918)—*Indian Jour. Med. Res.*, Vol. 4, p. 11; and Vol. 6, p 485.

87. MCINDOE, A. H. (1927)—'Collected papers of the Mayo Clinic and the Mayo Foundation,' Vol. 19, p. 218.

88. McLean, S. A., MacDonold, A. and Sullivan, R. C. (1929)—*Jour. Amer. Med. Assoc.*, Vol. 93, 93, p. 1989.

89. McNee, J. W. (1922)—*Brit. Med. Jour.*, Vol. 1, p. 716.

90. McNee, J. W., and Keefer, C. S. (1925)—*Brit. Med. Jour.*, Vol. 2, p. 52.

91. Minkowski, O. (1893)—*Arch. Exp. Path. Pharm.*, Vol. 31, p. 85.

92. Nadler, W. H., and Wolfer, J. A. (1929)—*Arch. Int. Med.*, Vol. 44, p. 700.

93. Parnass, J. K., and Wagner, R. (1922)—*Biochem. Ztschr.*, Vol. 127, p. 55.

94. Pelkan, H. F., and Whipple, G. H. (1922)—*Jour. Biol. Chem.*, Vol. 50, p. 499; *Ibid*, Vol. 50, p. 513.

95. Peters, J. P. and Van Slyke, D. D. (1931)—'Quantitative Clinical Chemistry,' Vol. I. Interpretations. Bailliere, Tindall and Cox, London. Pages 105, 445 and 247.

96. Pezzali, G. (1923)—*Pathologica*, Vol. 15, p. 663. (*Chem. Abstr.*, Vol. 18, p. 3216). Quoted by Peters and Vanslyke, p. 181.

97. Pickard, R. J., Pierce, L. F., Marsden, C. S., Tanaka, R. K., and Townsend, H. A. (1932)—*Jour. Lab. Clin. Med.*, Vol. 17, No. 5, p. 471.

98. Platt, R. (1931)—*Brit. Jour. Exper. Path.*, Vol. 12, No. 3, p. 139.

99. Rabinowitch, L. M. (1929)—*Jour. Biol. Chem.*, Vol. 83, p. 333.

100. Rowntree, L. G., Marshall, E. K., and Chesney, A. M. (1914)—*Tr. A. Am. Phys.*, Vol. 29, p. 586.

101. Rolleston, H., and McNee, J. W. (1929)—'Diseases of the Liver, Gall-bladder and Bile Ducts,' Third Ed.; Macmillan and Co., Ltd., London. p. 67.

102. Rothschild and Rosenthal (1916)—*Amer. Jour. Med. Sc.*, Phila., Vol. 152, p. 394.

103. Rowe, A. W., and Chandler, J. (1924)—*Endocrinology*, Vol. 8, p. 803.

104. Roe, J. H., and Schwartzman, A. S. (1933)—*Amer. Jour. Med. Sci.*, Vol. 186, p. 425. (*Abstract in Jour. Lab. Clin. Med.*, Vol. 19, p. 217).

105. Rozendaal, H. M., Comfort, M. W., and Snell, A. M. (1935)—*Jour. Amer. Med. Assoc.*, Vol. 104, No. 5, p. 374.

106. Sabin, F. R., Cunningham, R. S., Doan, C. A., and Kindwall, J. A. (1925)—*Bull. Johns Hopkins Hosp.*, Vol. 37, p. 14.

107. Schiff, L., and Senior, F. A. (1934).—*Jour. Amer. Med. Assoc.*, Vol. 103, No. 25, p. 1924.

108. Servantie, Panzat, and Monod (1924)—*J. de med. Bor deaux*, Vol. 12, p. 36a.

109. Shaw, A. F. Bernard (1925)—*Brit. Med. Jour.*, Vol. 1, p. 914 (May 16).

110. Shaw, A. F. B. (1927)—*Jour. Path. and Bact.*, Vol. 33, p. 1.

111. Shay, H., Schloss, E. M., and Bell, M. A. (1931)—*Arch. Int. Med.*, Vol. 47, p. 391.

112. Shay, H., Schloss, E. M., and Rodis, I (1931)—*Arch. Int. Med.*, Vol. 47, p. 650.

113. Shay, H., and Schloss, E. (1932)—*Jour. Amer. Med. Assoc.*, Vol. 98, p. 1433.

114. Shay, H. (1934)—*Jour. Amer. Med. Assoc.*, Vol. 103, No. 25, p. 1930.

115. Shay, H. (1935)—Discussion on Mann and Bollman's and Rozendaal, comfort and Snell's papers (*cf. Jour. Amer. Med. Assoc.*, Vol. 104, pp. 371 and 374 respectively) on Jaundice.

116. Shimoda, T. (1928)—*Jour. Biochem., Japan*, Vol. 9, p. 117 (*Chem. Abstr.*, 1929, Vol. 23, p. 168).

117. Somogyi, M. (1927)—*Jour. Biol. Chem.*, Vol. 75, p. 33; *Ibid*, Vol. 78, p. 117 (1928); *Ibid*, Vol. 83, p. 157 (1929); *Ibid*, Vol. 90, p. 725. (Quoted by Peters and Van Slyke, pp. 104, 105).

118. Somogyi, M., and Ronzoni, E. (1926)—*Proc. Soc. Exp. Biol. Med.*, Vol. 24, p. 220.

119. Spence, J. C., and Brett, P. C. (1921)—*Lancet*, Vol. 2, p. 1362.

120. Stadie, W. C., and Van Slyke, D. D. (1920)—*Arch. Int. Med.*, Vol. 25, p. 693.

121. Stander, H. J. (1924)—*Bulletin Johns Hopkins Hosp.*, Vol. 35, p. 46.

122. Stewart, C. P., and Tunnicliffe, H. E. (1925)—*Biochem. Jour.*, Vol. 19, p. 207.

123. Storm Van Leeuwen, W., Bien, Z., and Varekamp, H. (1922)—*Jour. Exper. Med.*, Vol. 36, p. 414.

124. Stott, H. (1927)—*Trans. 7th Congress, F. E. A. T. M., Calcutta*, Vol. 1, p. 138.

125. Stowe, W. P., Delprat, G. D., and Weeks, A. (1933)—*Amer. Jour. clinical Path.*, Vol. 3, No. 1, p. 55.

126. Tallermann, K. H. (1923)—*Quart. Jour. Med.*, Vol. 17, p. 37.

127. Theis, R. C., and Benedict, S. R. (1918)—*Jour. Biol. Chem.*, Vol. 36, p. 99.

128. Van Den Bergh, H. A. A. (1918)—'Der Gallenfarbstoff im Blute,' Leiden.

129. Von Fejer, A., and Hetenyi, G. (1924)—*Z. ges. exp. Med.*, Vol. 42, p. 670.

130. Wagner, F. (1914)—*Ztschr. f. Klin. Med.*, Vol. 80, p. 174.

131. Wakeman, A. M., and Morrell, C. A. (1930)—*Arch. Int. Medicine.*, Vol. 46, p. 290; *Ibid*, p. 382; *Ibid*, (Quoted by Peters and Van Slyke, p. 181), (III & IV).

132. Wauchope, G. M. (1933)—*Quart. Jour. Med.* (New Series), Vol. 2, No. 5, p. 117.

133. Widal, F., Abrami P., and Iancovesco, N. (1920)—*Presse med.*, Vol. 28, p. 893; and Vol. 29, p. 121 (1921), Paris.

134. Williamson, C. S., and Mann, F. G. (1923)—*Amer. Jour. Physiol., Vol.* 65, p. 267.

135. Wilson, C. M. (1922)—*Brit. Med. Jour.*, Vol. 1, p. 1061.

136. Wright, Samson (1928)—'Applied Physiology,' Second Edition; pp. 430, 196, 216 and 412.

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RACIAL DISCRIMINATION IN THE SERVICES : FURTHER SIDE-LIGHT ON THE RECENT GOVERNMENT RESOLUTION

We tried to show, in our March issue, how, since the War, the British members of the Indian Medical Service and the British Medical Association induced the Secretary of State to improve their prospects of Service and to bring about invidious distinctions between the European and Indian members of the same Service. Matters have been made worse by the Government of India Resolution No. 205 dated the 25th March, 1937. We draw the attention of our readers to this document which is published in the May issue of this Journal. We do not remember to have come across, within recent times, a more outrageous and impudent document than this resolution, the final authority for which is vested in the Secretary of State with the concurrence of the Government of India.

A brief analysis of the document will reveal to what extent racial discrimination has been carried forward in the guise of war reserve, specialist services and medical attendance on the British members of the superior services and their families. The system of recruitment by nomination is, of course, to continue. On the *military side*, Royal Army Medical Corps officers, who are all British, are employed to take care of the British soldiers. Two hundred and sixty-eight of these officers will be borne on the Indian establishment. The Indian Medical Service represents the corresponding cadre to take care of Indian soldiers. Of 364 I. M. S. officers under the new scheme, 220 will be British and 144 Indian. All the British officers will be on the permanent cadre, whereas the Indian element will represent only 39% of the permanent cadre, the rest being " short service " or temporary commissioned officers. The promotion of Indian officers to higher posts is thereby considerably circumscribed. The *civil establishment* is intended " to provide a Reserve of British officers to complete the numbers required by the Army on mobilization, to supply a nucleus of trained Indian officers for the same purpose, to ensure the number of British officers required for attendance on the British members of the superior civil services and their families and to meet the requirements of the Civil departments of the Central Government and the Crown Representative (corresponding to the present Home, Education, Health and Lands and Foreign and Political Departments)." The Civil Branch of the I. M. S. will consist of 220 officers, of whom 166 will be British and only 54 or 24% Indians. Two categories of officers are included in this number, *viz.* (1) War Reserve or those who are liable to be recalled to military duty in the event of war. Ninety-seven out of the 166 British officers and 50 out of 54 Indian officers or practically all the Indian officers will be placed under this category; (2) Residuaries or those highly placed officers who are not liable to be recalled to military duty. As many as 69 British officers and only 4 Indian officers will be placed under this category. Under the Central Government and Crown Representative or Political Departments, there will be 60 appointments, of which 25 will be British and the remainder either British or Indian.

Of the 166 British officers on the Civil establishment, 122 (which includes 45 residuaries) will be

employed in the provinces ostensibly to look after the health of the British members of the superior civil services and their families, while only 38 Indian officers (or barely 50% of the British War Reserve officers) will be employed in the provinces in comparatively unimportant positions. Sixty-two civil surgeoncies of the important stations will be reserved for British officers in the different provinces. The important professorial chairs in medicine, surgery, midwifery and ophthalmology in the various medical colleges and the superintendentship of important schools have been reserved for British members of this Service. Many of these posts were thrown open, within recent years, to well-qualified Indian members of the Service and even to medical men outside the services. A majority of such officers possess a proud record of brilliant and efficient service. With the inauguration of the New Reforms, all these privileges will not only be withdrawn from the Indian members of the I. M. S. but also the private medical profession. The posts of Resident Medical officers in the provincial medical colleges constitute the most important training ground for the alumni of the universities. Indians, who have been discharging their work with ability at these posts, will have to vacate them in favour of the British members of the Indian Medical Service. The Indian officers in the provinces will form 50% of the British War Reserve officers. while all the 45 residuary posts will be held by British members of the Service and none by Indians.

With regard to pay and prospects, the grossest injustice has been done to Indians in the attempt to safeguard the interests of the European officers of the same Service. While all the temporary commissions will be filled entirely by Indians, the percentage of those receiving permanent commissions has been kept vague and definite details about their future pay and prospects have been omitted. The rest of the temporary commissioned officers will be thrown out with a gratuity of Rs. 4,500/- after 5 years. The present British members of the permanent services get 25% more salary in the shape of overseas allowances, besides occupying most of the lucrative posts. In future, the difference in pay and allowances between the European and Indian members of the Service has been made wider, while nearly 75% of the European officers will occupy the most important and lucrative posts, the Indian members being offered a few comparatively unimportant ones. It may be pointed out here that Indians appointed to the Indian Medical Service, during the last 15 years, have been generally of far superior academic qualifications to the Europeans appointed to it.

The catalogue of injustices indicated above is too glaring and numerous to need any further elucidation. Let us view the question from another angle. For whose benefit are these officers appointed? Do we really need such highly paid European doctors for the British tommies in the Army in view of the success and popularity of Indian panel doctors in treating a better class of people in Great Britain? If their ability is admitted in Great Britain, is there any reason that capable Indian doctors will not be able to take care of the European military population in India? There is far less need for employing European officers to treat and look after the sanitation of Indian soldiers. Capable Indian doctors can be employed, at much less cost to the tax-payer, to carry out the duties as efficiently as their European confreres can do. The employment of members of this essential military service in the Civil administration is absolutely unwarranted and does not prevail in any other country of the world. Wherein lies the justification of offering so-called provincial autonomy with one hand and thrusting a large number of military officers on the Civil administration of the provinces with the other? The provinces are already so much over-burdened with top-heavy expenditure that they have not enough funds to formulate a progressive scheme. The Indian universities are turning out every year quite a large number of efficient medical men, many of whom supplement their training in Europe and are coming back after distinguishing themselves in almost all branches of the medical science. They are standing, and will stand, aghast at the spectacle of European members of this military service occupying the cream of appointments, academic and administrative, in each province, while they remain unemployed and disappointed in their own country which they naturally wish to serve. Wherein lies the justification of reserving the teaching posts in the most important subjects of medicine, surgery, midwifery and even ophthalmology for European members of the Service? The correct principle should be to select the best man fitted for the purpose, by open advertisement, irrespective of whether one belongs to a particular service or not or whether one is an Indian or European. One would not object if a man who is likely to render the best service in a particular job is appointed by the open door. But to thrust an European on them irrespective of their seniority, academic or other qualifications, is monstrous. Lastly, the

attempt to snatch away the junior resident posts in the important subjects of medicine, surgery and midwifery in the provincial medical colleges is brutal in the extreme. Where shall Indians get an opportunity to gain experience and knowledge and when will they be expected to take over the medical, public health and research activities of their own country, unless these key positions for training are offered to them? The relationship of medical colleges in this country and the universities to which they are affiliated is curious. The universities have no say in the appointment of teachers of these colleges, except perhaps at Lucknow. The sooner this anomalous position is cleared up, the better is it for the future of medical teaching and the medical profession in India.

One may naturally ask as to what should the members of the Indian medical profession do to thwart these wanton assaults on them in India. One way is to unite together and to protest, in an united voice, against these decisions to the provincial Ministers, the Government of India and the Secretary of State and to continue to do so until the order is unsettled.

If these attempts fail, we do not think we have any other course left but to take the drastic step indicated by the President of our Association in the following words: " The medical profession may well enquire what is the remedy. The passing of long-winded resolutions, censuring the Government, by adjournment motions in legislative bodies and measures of a like nature, have been of little avail in checking this exploitation; indeed they have led to the tightening of the grip of the Indian Medical Service and the European element thereof on the Indian Medical profession and the civil medical departments of the provinces. But Indians can also insist on being treated by their own countrymen. The Secretary of State may fill the country with British military doctors and pay them high salaries, overseas pay and allowances and other concessions; but it is open to Indians to say that they do not want any of them professorially. This can and should be their reply to the racial discrimination sought to be carried through the measures proposed in the *Communique* " (since supplemented by the Government Resolution on the subject).

MODERN THERAPY IN GENERAL PRACTICE

MODERN METHODS IN THE TREATMENT OF SOME COMMON RECTAL CONDITIONS

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In the realm of rectal surgery very many new procedures have come into existence recently which require a careful survey, both with respect to technique as well as the ultimate afterresult, necessitating in some cases the avoidance of a major surgical operation.

I shall put before you various procedures, some of which I dare say could be practised within the precincts of one's consulting room, and which in some instances do not require the patient to stay in bed. Such ambulatory treatment can very well be carried out in conditions like piles, prolapsus rectum, fissure-in-ano, etc.

I shall first take up the subject of piles or hæmorrhoids, which have caused quite a lot of suffering from time immemorial, and from which quacks have made fortunes.

It is extremely important to realise as to what exactly the condition of piles is, and therefore a thorough examination of the region of the anus and rectum is necessary in each and every individual case.

External Piles

In the first instance one may find on the anal margin what are known as external piles. The difference between internal and external piles is that the former are covered by bright red mucous membrane and are insensitive, whereas the latter are covered by skin and are extremely sensitive. In the acute variety of external pile, there is a history of a violent effort to pass a constipated stool, with the result that one of the hæmorrhoidal vein ruptures beneath the skin forming a hæmatoma. The patient feels a very tender painful lump at the anal margin. On examination there is a bluish swelling which is extremely tender and is very tense.

The treatment of these acute external piles is to inject a 2% solution of novocain underneath the skin around the periphery of the hæmatoma. The hæmatoma is then grasped with a forceps and is slit open transversely. The containing clot is shelled out like a pea from its pod from both halves of the divided hæmatoma. Next the edges of the skin are excised so that a small pear-shaped area of raw surface is left, which readily granulates and heals up.

Of course, there is also a chance of the hæmatoma getting organised and shrivelling up, remaining as a permanent fibrous tag of skin, but the patient remains constantly in pain for a few days. On top of it he runs a risk of ulceration and infection of the hæmatoma, with the result that a small anal abscess or a fissure might form. All these are avoided by the small operative procedure mentioned above, which secures immediate relief from tension and pain, and satisfactory healing always takes place.

Internal Piles

For the treatment of internal piles operative treatment is still practised by the majority of surgeons. The operation of hæmorrhoidectomy is of some magnitude, involving a stay in bed of 2—3 weeks with considerable afterpain following the operation. The discomfort of the patient is increased still further by not allowing his bowels to act for three or four days.

As against the operative treatment, the injection treatment of internal hæmorrhoids has the following advantages:—

1. That it is absolutely painless.
2. That it does not involve stay in bed (I usually allow my patients to carry on with their work or duties, if these be sedentary, on the same day after injection).

3. That it gives just as good results as the operative treatment if proper selection of cases is made.

Internal piles are classified according to the following three stages:—

Stage I. In this variety the internal piles on straining do not prolapse, and a diagnosis of these is only made by a careful proctoscopic examination. I may draw your attention to the fact that internal piles are never felt by the examining finger until and unless these are thrombosed.

Stage II. In this variety during the act of defæcation the patient notices that the piles protrude through the external sphincter, and on completion of the act, either the piles pops back or can be digitally replaced by the patient within the anal canal.

Stage III. This is an advanced condition in which during the slightest effort, *e.g.*, walking or exerting, the pile prolapses through a patulous sphincter, and remains there till it is replaced, or more often than not in this stage they remain constantly prolapsed.

There is still another variety of piles to which not much attention is paid and that is the interno-external variety, a type in which part of the pile is covered with mucous membrane and part with skin.

Now in selecting cases for injection it is only those in Stage I and Stage II which are suitable for treatment by the injection method. Interno-external piles as also external piles should never be injected. Stage III group are also not suitable for injection, as also when there is a superadded condition like fissure-in-ano, fistula, etc., which require surgical interference.

In order to understand thoroughly the injection treatment, it is necessary to go into the anatomy of the rectum, and especially its blood supply.

Anatomy. The rectum is the terminal part of the gut, commencing about the middle of the body of the third sacral vertebra, and ending at a point one and a half inches below and in front of the tip of the coccyx. It is about five inches in length, and the anal canal is an inch and a half. There are three lateral curves in the rectum, two to the right and one to the left, and in the concavity of each curve there are prominent shelves of mucous membrane which go by the name of valves of Houston. The direction of the anal canal is downwards and backwards. The mucous membrane of the anal canal presents in its upper third the columns of Morgagni and the valves of Morgagni. The columns of Morgagni are vertical folds from six to eight in number and each contains a branch of the superior hæmorrhoidal artery. At the lower ends of the columns of Morgagni are situated the anal valves which are similunar folds of mucous membrane, with free upper concave margins. Above each valve is a recess which is called the sinus. The upper two-thirds of the anal canal is covered with columnar epithelium and is insensitive. The mucous membrane of the anal canal in its lower third is replaced by skin and is extremely sensitive.

Blood Supply. The main supply of the rectum is from the superior hæmorrhoidal artery which is the direct continuation of the inferior mesenteric artery. At the level of the third sacral vertebra it divides into two branches, the right and the left. The left passes down into the rectal wall undivided but the right branch divides into an anterior and a posterior division. The soft redundant vascular enlargement of the superior hæmorrhoidal artery constitute internal piles.

If the rectum is viewed from below in the lithotomy position like the dial of a clock you will always notice three primary piles in the 3 o'clock, 7 o'clock and 11 o'clock position. This is accounted for by the fact explained above in the termination of the superior hæmorrhoidal artery. Smaller secondary piles may occur in between those primary piles.

Composition of Solution for Injection Treatment.—The older solution administered in injection treatment used to be 20% carbide of phenol in glycerine. There are many disadvantages of injecting such a strong solution, *viz.*, it causes sloughing on many occasions with resulting ulceration and pain.

The new solution is the one which I always use in my own practice and it consists of 7·5% phenol in vegetable oil. I prefer almond oil and add 4 grains of menthol to each ounce of solution. It has proved eminently satisfactory in every case injected.

Technique. The patient is made to lie in the left lateral position and a tubular proctoscope is introduced. A sponge on a holder cleans the rectum if necessary. About 5 c.c. of the solution are taken up in a special pile injecting syringe, and from 3-5 c.c. are injected in each pile. It is necessary to know exactly where to inject. The area of the mucous

membrane situated just above the pile is selected as the spot for introducing the needle. The needle should lie exactly in the submucosa. The solution runs quite easily if the needle is introduced in the right place. A bulge of mucous membrane is produced and sufficient solution must be injected to form a prominent bulge. This will depend on the laxity of the mucosa, and I find in practice that from 3-4 c.c. is the average dose. The quadrant which contains the largest pile is injected at the first sitting. It is better to inject each quadrant at weekly intervals and in all four injections are necessary to affect the whole pile bearing area, and complete the cure.

There is no special after-treatment given and it is not necessary, and as I have pointed out before it is necessary to let the patient lie in bed. The injection should be absolutely painless if given in the right place. If it is given too low down in the sensitive area of the anal canal, excruciating pain is felt.

The result of the injection is to produce an adequate thrombosis in the submucous layers of the vessels supplying the pile. In the injected quadrant an induration is felt in a week or ten days' time on rectal examination. The sclerosis produced by the injection strangles the vessels and drags up a prolapsed pile.

Anal Fissure

Now we come to a very common rectal condition which is the cause of acute and continuous suffering and that is fissure-in-ano. It occurs as a result of trauma due to hard scybalous masses passing over the over-distended anal region. Usually you find a fissure posteriorly in the majority of cases because of the anatomical arrangement of the fibres of the sphincter ani externus arranged in a racket shaped manner. So that there is a lack of support posteriorly where they are inserted in the coccyx.

The difficulty in treatment of the condition of acute fissure arises due to spasmodic continuance of contraction of the external sphincter muscle, thereby resulting in difficulty of giving proper rest and allowing the fissure to heal up.

Pain is usually very severe in this case, especially the patient dreads defecation due to the sharp tearing or cutting nature of the pain. This inevitably leads to constipation in a severe form thus setting up a viscious circle.

A recent fissure is amenable to the simple treatment which I am going to describe, but a chronic fissure with a sentinel pile or associated fistula requires an extensive operation.

For recent fissures in order to do away with the continuous spasm of the external sphincter a solution of Proctocain is injected as follows:—

About 5 c.c. of the solution is injected on either side of the fissure deep into the sphincter ani externus muscle and about ½ c.c. of this solution is injected under the base of the fissure itself.

The result is relief of pain within 24 hours. There is marked relaxation and diminution of the spasm of the sphincter which persists for 2-3 weeks during which time it gives rest to the part and gives a chance for the fissure to heal up. In those cases where with injection of the solution sphincteric spasm persists it is of value to do a thorough stretching of the sphincter.

In my experience there is never any tendency for over-relaxation in cases where a thorough digital stretching of the sphincter is made. A well stretched sphincter regains its tone within a week.

Fistula-in-Ano

The diagnosis of fistula-in-ano is made by inspection when an external sinus round the anal margin is seen.

On palpation by a finger in the rectum, the indurated track can very often be felt, and sometimes the internal opening may be made out. The internal openings of the majority of fistula are in the midline, anteriorly or posteriorly.

A probe-pointed director can also demonstrate the direction of the main track, but the recent method is to inject lipiodol in the tract of a fistula and then x-ray the patient. In this manner the various tracts of deep fistula could be ascertained before the operation and serve as a guide to completely extirpate each and every tract.

Often do we find patients having chronic fistula, who have been submitted to an operation and the fistula has recurred. This is due to leaving behind of a tract or to inadequate drainage which results in these incomplete operations.

Goodsall's rule in cases of fistula generally holds good, and it is better to bear it in mind. It can be briefly stated as follows:

If a line is drawn transversely across the anus, those fistulæ with external openings posterior to this line tend to be of the horse-shoe type, and communicate with the bowel internally by a single opening situated in the midline posteriorly. Those fistulæ which have their external openings in front of this line tend to be of the direct type. This rule does not, however, hold good every time.

The treatment of fistula-in-ano is operative every time.

The present day tendency is to operate in two stages in fistulæ passing deep to the external sphincter and the younger surgeons are adopting this method more frequently.

At the first sitting all collateral tracts are ruthlessly followed and opened up. The main tract is identified but is not cut open. A silk ligature is passed through it and knotted loosely round the external sphincter which is not divided. The second stage of the operation is undertaken two weeks later when the tract which is formed by the silk ligature is laid open.

The result is that in a case of fistula with multiple tracts if the sphincter is divided at the same time during the first operation its fibres tend to split apart, in the cicatricial tissue formed as a result of healing of the wound. This would lead to a partial or total incontinence, which is avoided by the two stage operation.

It is to be borne in mind that the external sphincter should be divided only once for if done in two places incontinence is sure to result. Also in high fistula it is unwise to divide the internal sphincter for the same reason.

The after-treatment should be carried out most assiduously and under no circumstances should any pocketing be allowed to result. The wound which usually is extensive should be allowed to heal up from the bottom.

Prolapse of the Rectum

If the mucous membrane of the rectum prolapses, it is a partial prolapse, if the whole thickness of the rectal wall is extruded it is a complete prolapse. It is important to bear in mind that in cases of complete prolapse, especially in women the peritoneal pouch is included anteriorly in the prolapse. The tone of the sphincter is diminished in cases of complete prolapse. Bleeding and sero-sanguinous discharge from prolapse is a great discomfort to the patient, as also the frequent changes of pads soaked with foul discharge render the life of the patient miserable.

In the more advanced cases of prolapse in adults major mutilating operations are still practised such as excision of the whole prolapse, sigmoidopexy, rectopexy by Lockhart Mummery's operation, Moschowitz operation of obliteration of the pouch of Douglas, etc. These methods in the opinion of majority of present day surgeons have proved unnecessary and in most cases unsatisfactory.

The treatment of prolapse by means of high submucous injections is now in favour in the majority of clinics.

Technique. A long tubular proctoscope is passed into the rectum reaching the lax mucosa as high as possible. A number of high injections in the submucosa is given in the same manner as I have described in case of hæmorrhoids. The whole circumference of the rectum is injected at highest level, and the later injections are given successively lower down. Up to 15 c.c. are injected at the first sitting.

Next the perirectal tissue is injected with the solution containing 12 grains of quinine sulph., 30 min. of acid sulph. dil. and 30 min. of aqua dist.

The technique of perirectal injection is as follows: The left index finger is introduced in the rectum to guard against the needle puncturing the rectal wall. The needle is introduced one inch external to the anus and passed deep into the perirectal tissues for about 3 inches. 3 c.c. of the quinine solution is injected deep down in the perirectal tissue. Three punctures are necessary to infiltrate the perirectal tissues, *viz.*, two lateral and one posterior.

The bowels are confined for a few days after these injections.

The day following the injections voluntary contractions of sphincter ani externus and levatores ani is commenced. These help considerably in regaining the lost tone of these muscles when the prolapse has ceased to come down.

The result of injection is to produce a firm diffuse induration into the rectum high up which is

noticed by the examining finger in about eight to ten days' time. The inflammatory process causes the redundant mucosa to be firmly adherent to the rectal wall and thereby brings about a cure of the prolapse.

This method has not been generally known and deserves to have a wider scope. The results obtained by it are just as good as have been obtained by major operations involving considerable danger.

And now finally I propose to suggest a simple method for the alleviation of pain in those dreadful cases of inoperable carcinoma of the rectum. It is a most distressing condition, and cases generally come to the surgeon in this country in their terminal stages.

This palliative treatment consists in intraspinal injection of alcohol.

With a small bore needle a lumbar puncture is done and absolute alcohol is injected very slowly drop by drop till about 0·5 to 1 c.c. is given. The patient lies on the side opposite to that affected for a period of 15 to 20 minutes and is then made to lie on his back for a period of two hours. The injection can be repeated within a few days or weeks, according to the relief afforded to the patient.

This intraspinal injection of alcohol can be carried out for the relief of pain in any pelvic cancer, *e.g.*, carcinoma of uterus, ovary, bladder, prostate, etc., with gratifying results.

CASE NOTE

COMPLETE TRANSPOSITION OF VISCERA REVEALED DURING OPERATION OF PERFORATED GASTRIC ULCER

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Hindu male aged 30 years, came to the Hospital on 17-2-36 at about 1 p.m. with acute pain over the abdomen.

History of onset of the illness. The patient said that at about 6 a.m. the same morning while engaged in sweeping the floor he came in for a sudden sickening pain in the upper abdomen. This soon became most marked in either hypochondriac regions and later on in the hypogastric region also. He had no motion since then although urine was free. He gave history of passage of flatus once about two hours after the attck of the pain. The patient took only a little *chira* (parched rice) and water a little before the attack of pain and a small quantity of water after the attack.

Past history. He had an attack of hæmatamesis and melæna 3 months back. This was not severe but took about one week to pass over. He was a chronic sufferer from dyspepsia and acidity and occasional pain in the upper part of abdomen. This pain, however, had no definite time relation to food nor any definite radiation. He was habitually constipated. He was addicted to chewing betel and tobacco

Occupation, caste, etc. An inhabitant of Orissa and household servant by calling.

General survey. A thin adult male with fair musculature but little adipose tissue. Expression anxious. Respiration 24 per minute, laboured with limitation of movement of the abdomen. Pulse rate 104 per minute. Volume and tension fair, temperature 98° F, teeth good, tongue dryish. History of syphilis some time back. On auscultation of the lungs some deficient air entry at bases was noticed. Examination of heart revealed dextrocardia, the apex beat

being in the 5th right space outside the mid-clavicular line.

Local examination (*abdomen*). Lower part of abdomen moving with respiration. Some fullness of the left hypochondriac region. No generalised distension. No visible peristalsis.

The whole abdomen had a resistant feel being more marked over the upper part of both the recti. Upper abdomen was tender to touch. With every respiration the patient had a catch in the breath. Abdomen fairly tympanitic all over. Liver dullness absent. Splenic dullness discernible in the usual position. Shifting dullness present. Abdomen not absolutely silent.

Rectal Examination. Nothing significant.

The provisional diagnosis was perforated gastric ulcer. The principal criteria deciding the diagnosis were (1) past history, (2) mode and character of onset of present illness, (3) complete absence of liver dullness, (4) presence of shifting dullness, (5) general appearance of the patient.

The detection of dextrocardia suggested the possibility of transposition of abdominal viscera also.

Operation under Chloroform

A deliberate right paramedium incision was made. On opening the peritoneum very little odourless gas came out. Fair amount of free fluid, slimy in character was found. This was partly mopped out. Spleen was found on the right hypochondriac region. No cæcum or appendix on right side. On further exploration, liver and stomach were detected on the left side. The abdominal incision was enlarged to facilitate thorough exploration. An opening about $\frac{1}{8}''$ in diameter was found on the anterior surface of the stomach near the pyloric end. Margin of the opennig irregular (surrounding tissue hard and highly friable) the diameter being one-third of an inch or more. Rent in the stomach sutured with No. 00 cat-gut—the sutured line being further strengthened by a second layer of suture and the whole area covered by omental graft. No other perforation was detected. The head of the pancreas was found on the left and the tail on the right side of the middle line. The cæcum and appendix on the left side. Abdominal wall sutured in layers with a rubber drainage tube at the lower angle.

Treatment

(1) Anti-gas serum—20 c.c. intra-muscularly and (2) Glucose solution 25% 50 c.c. with calcium chloride solution 5 c.c. intravenously before the patient regained consciousness.

Uneventful recovery. The patient was discharged from the hospital on the 17th March, 1936.

Discussion

My excuse for reporting the case is that complete transposition of viscera is not very common and rupture of an ulcer in a right-sided stomach is less so.

What was thought to be splenic dullness was evidently dullness of the liver on lateral aspect and, in fact, it was the splenic dullness that was absent.

The right-sided incision did not add any great difficulty to the exposure of the part; for, in practice the incision is very close to the mid-line.

Before operation right-sided stomach could only be suspected as there was no means to be absolutely certain about the condition though there was dextrocardia.

In very early cases it might be possible because of referred pain to the left shoulder. X-ray examination would also help by showing the position of the liver.

CURRENT MEDICAL LITERATURE

MEDICINE

Aetiology and Diagnosis of Lymphadenoma

GORDON (*Proceedings of the Royal Society of Medicine*, March, 1937, page 541) mentions two new points regarding lymphadenoma, *viz.* (a) a biological test for lymphadenoma and (b) the presence of elementary bodies in lymphadenoma and their significance. The test depends on the observation that the lymphatic gland suspension in broth (1 in 10) when injected into a rabbit's brain produces after an incubation period of one to five days an encephalitic syndrome showing rigidity, incoordination, ataxia and a progressive loss of weight. Injection of suspension of glands other than lymphadenoma does not produce such an effect. The diagnostic value of this biological test has been confirmed by other workers and the test is of particular value when the histology is atypical and it has been found that the more acute the case the more active the suspension is for the rabbit's brain. The author notes further that the appearance and the staining reactions of the elementary bodies present in the gland resemble the Paschen bodies of vaccinia. The presence in the blood of lymphadenoma patients of flocculating antibodies to suspension of these elementary bodies has been tested but the results, however, have been irregular. Special attempts are being made to improve the technique and if the specific serological test is obtained we will have in it a valuable measure in the clinical diagnosis. The vaccine made out of these bodies have been therapeutically tested and found to be helpful though causing much reactions. WARNER reports in the same issue 4 cases with marked clinical improvement with the treatment of a specially prepared sensitized vaccine made by GORDON though he reports at the same time 3 cases where vaccine therapy failed. The results obtained by the authors are not final and they are trying for better results. However, they contend that this sensitized vaccine is a helpful therapeutic agent in lymphadenoma.

Some General and Remote Consequences of Gastric Diseases

RYLE (*Clinical Journal*, April, 1937, page 133) deals in the following lines some general and remote consequences of gastric disease. (1) Gastrogenous diarrhœa—painless morning diarrhœa with yellow (not white) stools unmixed with any mucus or blood, history of past gastritis, alcoholism or severe infection, *e.g.*, typhoid, test-meal showing achlorhydria or hypo-chlorhydria, x-ray exhibiting gastric hurry and marked improvement with acid hydrochlor. dil. with meals. (2) Sore tongue—often accompanies pernicious anæmia and microcytic anæmia of women in the 3rd or 4th decade. Cracked corner of the mouth and brittle and concave nails are common in microcytic achlorhydric anæmia. (3) Acne rosacea is associated with dyspepsia in alcoholic men and tea-drinking women and hydrochloric acid after meals combined with alkaline draught in the early morning acting as a gastric lavage will clear up the condition. (4) Blood diseases—both megalocytic and microcytic anæmia occur in gastric carcinoma and severe anæmias may also follow gastrectomy and gastro-enterostomy operations. (5) Alkalosis and uræmia may follow intensive alkaline therapy in certain cases of peptic ulcer where any degree of pyloric stenosis is present. Pyloric stenosis of slight degree with vomiting and without massive alkaline treatment may cause alkalosis with increased urea in the blood. Alkalosis and uræmia also follow severe gastric hæmorrhage. (6) Peripheral neuritis may complicate gastric cancer. (7) Thrombophlebitis—cancer of the stomach through biochemical changes leads to phlebitis with thrombosis in the peripheral veins of the limbs.

Observations on the Use of Carbon Dioxide in Early Pneumonia

GUNTHER AND BLOND (*American Journal of Medical Science*, April, 1937, page 525) write from clinical observations that the early use of carbon dioxide is a valuable measure in the treatment of pneumonia as it definitely reduces the mortality rate and shortens the course of both broncho and lobar pneumonias, especially the former, the average days of fever being 4·3 and 5·2 days respectively. The details of treatment are given below. Each treatment consists of 2 inhalations of carbon dioxide at the interval of 3 to 5 minutes; each inhalation lasting only one minute

and carbon dioxide being given at the rate of 3 litres per minute. This treatment is repeated every 3 hours during waking hours and is given once or twice at night when the patient is awake and it is continued, until the fever comes down to normal. The immediate effect of its use as observed in his cases is hyperapnœa followed by paroxysm of cough which brings up a lot of purulent material after which the patient feels much relieved. The fever is soon abated, toxicity diminished and the patient feels and looks well.

The Prognosis following Recovery from Coronary Thrombosis with special reference to the Influence of Hypertension and Cardiac Enlargement

PALMER (*Quarterly Journal of Medicine*, Jan., 1937, page 149) reports on the investigation of the influence of hypertension and cardiac enlargement on the prognosis of 212 cases of coronary thrombosis which survived the attack by 3 months. He observes that blood pressure changes and the height of blood pressure are on the whole of little prognostic significance and it is the cardiac enlargement (as evidenced by dyspnœa on exertion in mild cases and congestive failure in severe cases) that is the most important factor in causing restriction of activity. Patients with normal-sized hearts will have twice as great chance of leading active lives after recovery from the attack than patients with enlarged hearts. The statistics given by the author shows that more than quarter of the cases lead fairly active lives and in the remainder angina of effort and dyspnœa on exertion (including chronic congestive failure) were responsible in equal proportion for restriction of activity or invalidism. Angina occurred in 39% of the cases prior to the attack, in 58% following it and in less than 10% of the cases the prior angina failed to recur after the attack. Congestive failure was present in 13% of the series. Subsequent attacks of thrombosis occurred in 20% and about half of them in the first two years and only 1/5th of them proved fatal. The incidence of these attacks was unrelated to the height of blood pressure but was found higher in cases with enlarged heart than in cases with normal hearts. The average duration of life in 65 cases that died was 4·2 years, hypertensives having a better life-expectancy than non-hypertensives. Short histories are given of 11 cases which survived the attack by 10 years and more.

Transient Auricular Fibrillation as a Toxic Manifestation of Digitalis

TUNG (*American Heart Journal*, 12:1936, 272) reports 15 cases two without and 13 with heart disease in whom full digitalization caused the appearance of auricular fibrillation with other signs of digitalis intoxication as evidenced clinically and electrocardiographically. The abnormal rhythm in all the cases disappeared spontaneously several days after the drug was discontinued. The author holds that under certain circumstances transient auricular fibrillation may appear as a toxic effect of digitalis and when such abnormal rhythm occurs the drug should be stopped.

The Choice of Hypnotics

GRABFIELD (*Journal of American Medical Association*, Oct. 24, 1936, page 1381) writes that chloral hydrate is still the best and cheapest of the hypnotics and in the usual dose of 5 to 10 grains is entirely harmless even in heart cases and produces good sleep in one hour's time. Barbiturate series are particularly useful for quick action of short duration. Phenobarbital combined with bromides will be sufficient in cases where sleep is disturbed by restlessness. The drugs of the opium groups should be limited only to cases where pain is the predominant feature and acetyl salicylic acid alone or combined with chloral or a barbiturate will often do marvellous results like morphine without producing its bad effects.

Mandelic Acid Therapy

BRAASCH (*Journal of American Medical Association*, March, 1937, page 1033) observes that mandelic acid therapy is successful in 80% of cases of uncomplicated urinary infection, that the organisms which have responded to the treatment include Escherichia coli, Aerobactor aerogenes, and, in addition, members of the genera Proteus, Pseudomonas, Alcaligenes, Salmonella and Shigella and Cocci to a lesser degree. The author further observes that there is often a great reduction of infection with marked amelioration of symptoms though the urine does not become bacteria-free. The author mentions for success of the treatment the limitation of fluid intake to 1200 c.c. in 24 hours and the maintenance of the pH level of the urine at 5·5 or less with the use of ammon chloride

or nitrohydrochloric acid, if necessary. Failure in treatment is due to complications such as (1) pyelonephritis with advanced cicatrical changes in renal pelvis, calices and ureter, (2) residual urine in any portion of the urinary tract, (3) chronic prostatitis, (4) lithiasis or tumor in any part of the urinary tract, (5) occasional impossibility of lowering the pH of urine to 5·5 by any means. Nausea, diarrhœa, renal irritation and hæmaturia have been observed during mandelic acid administration.

Functional Therapy of Insufficiency of the Liver

PRIBRAM (*Munchener med. Wschr.*, No. 49, 1936) observes that the building up and disintegration of glycogen in the liver can be systematically and rhythmically influenced by alternate injections of insulin and thyroxin. He advises the use of 8 units of insulin with 20 c.c. of a 40% grape sugar solution given intravenously on two successive days alternating with two days with intramuscular injection of 1 c.c. of 1 per mille thyroxin solution. The concentrated sugar solution has an additional dehydrating effect of removing the actual swelling of the liver which is an early symptom of liver insufficiency. This zig-zag method is much more effective than the continuous insulin treatment. The treatment is continued for 3 to 6 weeks and repeated after 2 or 3 months, if necessary. Marked improvement has been observed in all forms of liver insufficiency, particularly in cirrhosis of the liver.

The Internal Treatment of Pulmonary Tuberculosis

ZONDEK AND WEISER (*Wien. Klin. Wsch.*, No. 2 1937) recommend for intensive absorption of ingested calcium and consequent calcification of pulmonary foci a diet as free as possible from sodium chloride and a supply of alkalies, vitamin D, phosphorus and parathyroid extract. They prescribe 6-8 gms. of calcium, an equal quantity of soda bicarb. (the affinity of the pulmonary tissues to calcium is increased by alkalisation), Haliverol 5 drops thrice daily, one table-spoonful of 5% calcium glycerinophosphorus thrice daily and ½ c.c. parathyroid extract (1 c.c. containing 50 collip units) thrice weekly. This treatment is soon followed by a drop in the temperature, increase in weight, diminution of sputum and retrogression in the process of infiltration as evidenced by skiagram.

Raw Vegetable Diet in Chronic Rheumatism

HARE (*Proceedings of the Royal Societu of Medicine*, Nov., 1936, page 1) reports on the successful treatment of 12 cases of chronic rheumatism with raw vegetable diet for periods of 2 weeks followed by modified diet for further periods. In 10 cases there was relief of pain and those with muscular pain and stiffness got the best results and the author attributes this benefit to low sodium content of the diets.

SURGERY

Complications of Gall-bladder Surgery

HEYD (*Annals of Surgery*, Jan., 1937, page 1) from his personal experience of 557 patients with biliary tract surgery observes that the complications of gall-bladder surgery can be reviewed as (1) anatomical, (2) infectious, (3) chemical and (4) metabolic. In the first 24 hours the complications are anatomic such as hæmorrhage, shock, gastric dilatation and embolism. In the next 48 to 72 hours they are infectious causing peritonitis and later on abscess formation. Such complications as alkalosis, hypochloræmia, hypohydration or the acidosis from intractable diarrhœa and the complications of obscure and perverted liver chemistry, k.a. "liver deaths" fall under chemical and metabolic groups. Three clinical types of cases are described under the last heading. The first type is characterized by a continuously ascending temperature almost immediately after operation in patients who were considered quite satisfactory before operation, with rapidly developing stupor and coma with death in 18 to 36 hours. The second type consists of a case who had the operation for the relief of obstructive jaundice and who developed quite suddenly in his convalescence (on the 4th or 5th day) stupor and coma ending in death. The third type of cases shows at the end 24 to 36 hours after operation a profound cardiorenal collapse with cold clammy skin and gradual failure in water elimination and retention of urea nitrogen in the blood, soon ending in death.

The author operated on 557 patients of which 500 were uncomplicated cholecystectomies and 55 were patients that required in addition to surgery of the gall-bladder or biliary tract such operations as gastro-enterostomy, gastric resection or pyloroplasty.

Post-operative hæmorrhage specially in patients operated for obstructive jaundice is a formidable

danger. In the postmortem examination of patients who died after common duct operation for obstructive jaundice, blood in the peritoneal cavity was found in 40% of the cases and in such amount as to be certainly a complicating factor in producing death Pancreatitis was present in 21 patients and 5 patients died of this complication. 13 patients had malignant gall-bladder, 8 patients died of "liver deaths," 3 from secondary hæmorrhages, 4 from dehiscenes and 3 from intestinal operation subsequent to operation—the total number of deaths being 39. Subphrenic abscess is a rare complication. Grave cardiovascular renal disease and pneumonia account for a certain percentage of uncontrollable mortality and prolonged pre-operative treatment is suggested as a means for the reduction of such mortality. Of 557 patients operated by the author 417 were private and 140 clinic patients and the mortality rates in the groups are 4·8% and 13·5% respectively. The author maintains that this difference in the mortality rate is due to procrastination to surgery by the clinic patients. The author concludes by saying "with due consideration of all the factors involved—the type of lesion, the biological background of the patient, the adequacy of the surgical intervention, the complications and the mortality—still surgery for gall-bladder disease is safe and highly satisfactory."

Peritonitis—a Circulatory Problem

Friedrich (*Wiener klinische Wochenshrift*. Feb. 5, 1937, page 153) lays great stress on peripheral circulation in the treatment of peritonitis. He maintains that if the patient survives the circulatory crisis he is out of danger. For the maintenance of the peripheral circulation he advises the following measures to be adopted, *viz*. (1) local anæsthesia should be used in preference to general anæsthesia as the latter impairs the splanchnic circulation, (2) exteriorisation of the intestine and the size of the surgical wound should be made such as to cause least post-operative pain because the greater the pain the more the impairment of abdominal respiration and consequently the peripheral circulation, (3) vasotonics particularly adrenaline preparations are to be used in preference to cardiac stimulants to draw the blood away from the splanchnic vessels with administration of fluids by continuous drop infusion method to prevent prolonged withdrawal of blood from the heart, (4) carbon dioxide should be used to stimulate the respiratory centre and thereby improving the circulation in the system of the portal vein, (5) heat should be applied locally on the skin of the abdomen in the shape of sterile fomentations.

Fatal Reactions after Infusion of Gum Acacia Glucose

Studdiford (*Surgery, Gynæcology and Obstetrics*, April, 1937, page 772) reports 3 cases showing cyanosis, dyspnœa, tachycardia and pulmonary œdema following intravenous administration of gum acacia glucose solution. Two of them died and one recovered. The post-mortem report of one case reveals extensive destructive lesion of the liver. Three more cases are reported two of whom died and one case showed at autopsy "acute yellow atrophy." In experimental animals acacia solution produces liver damage and serious disturbances of the red cells causing interference with gaseous interchanges. It also causes agglutination of the red cells with resultant capillary blockage producing œdema and hæmorrhage. The author contends that intravenous gum acacia should be used with caution, particularly in patients with damaged liver and may be replaced by intravenous use of ordinary saline and glucose.

PATHOLOGY AND BACTERIOLOGY

Tuberculous Tracheobronchitis : Its Pathogenesis

Bugher, Littig and Culp (*American Journal of Medical Science*, April, 1937, page 515) observe that tracheobronchitis is a common complication of pulmonary tuberculosis and occurs more frequently in cases of long duration. From the autopsy study of 122 cases of pulmonary tuberculosis they found in 50 cases (41%) lesions in the trachea, main bronchi or both. The mode of infection is predominantly by contact with bacillary sputum, but may be by direct extension from peribronchial structures, the portal of entry is either through the epithelium or by way of ducts of the mucous glands, and the involvement is widespread and most marked along the posterior wall.

Gonococcus Complement Fixation Test

Cohn (*Journal of Laboratory and Clinical Medicine*, March, 1937, page 627) gives the technique of the test as is done in the diagnosis of gonorrhœa and reports on the study of 490 cases and the results obtained thereof are given in a tabular form. The author observes that this test does not intend to

replace the clinical and bacteriological methods of diagnosis but is a supplementary procedure helping in the diagnosis and the determination of cure of the disease. The production of complement fixing antibodies depends on the duration and spread of the infection—in acute complicated cases the test is strongly positive whereas in chronic cases of long duration it is weakly positive. If a clinically and bacteriologically negative case of gonorrhœa gives negative complement fixation reaction the cure is certain but when such a case gives positive reaction there is a strong indication of the existence of a latent focus of infection and further examination detects such a focus and herein lies the value of the test.

Blood Chemistry of Hookworm Anæmia

VILLELA and TEIXEIRA (*Journal of Laboratory and Clinical Medicine*, March, 1937, page 567) observe that there is in hookworm anæmia hypoproteinæmia and hypocholesterinæmia due to lack of these substances in the diet of these patients. They further observe that the albumin fraction of the plasma protein is decreased, the globulin fraction being unaffected or slightly increased. Diet rich in protein clinically improves the œdematous conditions of the patients.

Transfusion of Placental and Retroplacental Blood

STAVSKAYA (*Novy Kirurgicheskiy Arkhiv*, 37: 145: page 72) writes that the distinguishing characteristics of the placental blood are high hæmoglobin content, increased morphologic elements, considerable bilirubin content, high sugar content, low cholesterol and alkali reserve. The potassium and calcium content in the blood amounts to from one and one-half to two and half times that of normal while the albumin content of the plasma is lowered chiefly at the expense of the globulins. It contains estrogen, gonadotropic substance and an epinephrine-like substance. It is also distinguished by its rapid coagulability. The author reports the use of retroplacental blood in the obstetric-gynæcologic clinic of the mother and child Institute in Kiev. The amount of blood obtainable from a retroplacental hæmatoma varies from 80 to 300 c.c. Morphologic and biochemical studies of the placental blood demonstrate its similarity to that of the mother's blood. The iso-agglutinating properties are sharply defined and the blood grouping corresponds always to that of the mother's blood. The blood *in vitro* shows a little tendency to coagulate and may be kept without preservatives for ten to twelve days. A 4 or 6 per cent. solution of sodium citrate was used as a preservative in a series of cases. This blood remained sterile for fifteen days. Placentas expelled later than four hours after the delivery of the child were rejected. Syphilis, malaria, tuberculosis, infectious disease, puerperal endometritis and marked soiling of the vagina were considered contraindications. Only identical blood group was used. The author enumerates the following indications for transfusion of placental blood: (1) acute anæmia due to hæmorrhage, (2) puerperal sepsis, (3) cases in which it is desirable to increase the immunity because of anticipated puerperal complications, (4) gynæcologic hæmorrhages resulting from metropathies or hormone disturbances and (5) preoperative and post-operative period in weakened and exhausted patients. (*Current Medical Literature—J. A. M. A.*, April 3, 1937, page 1226).

PEDIATRICS

Immune Globulin in Measles

GOLDSTEIN, EISENOFF and BLAUNER (*American Journal of Diseases of Children*, January, 1937, page 110) report on the effect of immune globulin in the prophylaxis and treatment of measles. The immune globulin is a saline extract of the globulin fraction of human placenta and its contained blood. 128 children ranging in age from 1½ and 10 years at the Israel Orphan Asylum had measles. 49 of them were inoculated within the optimum period of exposure of 5 days or less with intramuscular injection of 4 c.c. of the serum into the gluteal region and the remaining 79 were in the control group. 32 out of 49 immunized children contracted measles and 82% of them were of mild types whereas 56 out of 79 in the control group got the measles and 22 out of them had severely toxic manifestations of the disease. The authors contend that as measles is very contagious and often attended with serious complications immune globulin is valuable in its prophylaxis and treatment.

Intestinal Stasis due to Low Mineral Intake

ROBERTSON (*American Journal of Diseases of Children*, Feb., 1937, page 500) observes that rats fed on low mineral diets show intestinal stasis as evidenced

by dilatation and overloading of the large bowel and delayed excretion of barium and that this stasis clears up when calcium and potassium salts are added to the deficient diet. The author further observes that fourteen out of the nineteen children fed on diets low in calcium and potassium developed constipation and 33% of these children showed retention of barium in the appendix for abnormally long periods whereas the same children when fed on normal diets failed to show any such abnormality.

Use of Convalescent Serum in the Prevention of Chickenpox

Lewis, Barenburg and Grossman (*American Journal of Diseases of Children*, March, 1937, page 750) in reporting on the investigation regarding the usefulness of convalescent serum in the prevention of chicken-pox observe that 23 children exposed to chicken-pox from one to three days previously were inoculated with convalescent serum whereas 19 were used as controls and that 91% of the treated group and 95% of the untreated group contracted the disease and that the disease was more severe in the group treated with the serum. These observations go to show that convalescent serum is of no value in the prevention or mitigation of the disease.

The Treatment and Prognosis of Puerperal Empyema in Childhood

Utter (*Acta chirurg., Scand.*, 1936: 79:545) reports the results of treatment of 282 cases of pleural empyema in children.

The author advises that puncture should be attempted in empyema of small size and when no noteworthy diminution of pus takes place after 5 punctures, secondary resection should be taken recourse to. If pus is thick thoracentesis should be done to be supplemented by resection. In large empyema puncture may be tried as palliative treatment to be followed at the proper time by resection. Puncture when continued for long gives poorer prognosis.

The results are summarised in the following table:—

Method of Treatment.	Total Cases.	Results.
I. Puncture—pus evacuated by aspiration ...	53	20 (37·8%) cured, 9 (17%) died, 25 (45·4%) required secondary resection.
II. Thoracentesis—pus evacuated by a tube or canula introduced between the ribs	48	33 (68·7%) cured, 8 (16%) died, 7 (14·6%) required secondary resection.
III. Primary resection soon after diagnosis resection of the ribs or thoracostomy	145	84 (61·4%) cured, 49 (33·8%) died, 7 (48%) developed chronic empyema.
IV. Secondary resection	45	36 (80%) cured, 8 (17·8%) died, 1 (2·2%) developed chronic empyema.

NUTRITIVE VALUE AND COST OF RED PALM OIL

Red palm oil is derived from the fruit of the West African palm *elaeis guineensis*. This palm has been imported into Malaya and Burma; in the former country it appears to be extensively grown, but not so as yet in the latter. It has not been introduced into India.

A number of workers have shown that red palm oil is very rich in carotene, the precursor of vitamin A, and that it can supply the vitamin A requirements of rats when given in very small quantities. Hitherto, however, it has not been conclusively proved that carotene can fully replace vitamin A in the diet of human beings. Nor has its effect in cases of keratomalacia been observed; it seemed possible that, in such cases, efficient transformation of carotene into vitamin A might not take place. It was therefore felt desirable to carry out clinical test of red palm oil before taking steps to encourage its production and consumption in India.

Clinical Observations: Red palm oil, contained in a suitable emulsion, was given a trial by Lt.-Col. R. E. Wright, I.M.S., Professor of Ophthalmology, Madras, in the treatment of severe cases of human keratomalacia. Lt.-Col. Wright is probably the foremost living authority on keratomalacia. He reports that red palm oil is as rapidly effective as cod liver oil in treatment. In a number of cases rapid improvement took place in cases which remained living under the identical domestic conditions in which they had developed the syndrome, the only change in their daily routine being the addition of red palm oil emulsion to their diet. In addition, the progress of cases in hospital on red palm oil and cod liver oil was carefully compared. While Lt.-Col. Wright points out that clinical investigations of this nature are necessarily less clearly defined than laboratory investigations under carefully controlled conditions, he has nevertheless fully convinced himself of the effectiveness of red palm oil. The decision of so experienced a worker can be accepted as conclusive.

If red palm oil cures keratomalacia, then its carotene must be capable of satisfying the daily vitamin A requirements of human beings.

The Cost: Red palm oil is obviously a valuable potential source of an important vitamin. It is, however, difficult to make a satisfactory estimate of its probable cost should it come to be used on a wider scale as a medicine or a dietary ingredient. Red palm oil, shipped in bulk from Singapore, costs at present about 180 Straits dollars per ton. This would work out at approximately 2 annas per pound. Cod liver oil in India costs from 10 annas to Re. 1/- per pound. Allowing for differences in vitamin A activity per unit of weight, the following very rough comparison of cost can be made:—

If the cost of red palm oil and cod liver oil is taken as about 2·5 annas and 12 annas per lb. respectively, the amount of vitamin A activity purchasable for a given sum in the form of red palm oil will be about 3 times greater than that purchasable in the form of cod liver oil.

Uses: Clearly red palm oil merits attention on the part of the agricultural authorities and nutrition workers in the Tropics and the East. It could be widely used as a cheap substitute for cod liver oil in hospitals, dispensaries and children's homes. The fact that, unlike cod liver oil, it contains very little or no vitamin D, is not necessarily a drawback to its use in countries where vitamin D is supplied by abundant strong sunlight and rickets is rare. In India, it could be used in the South and other parts where vitamin A deficiency is common and vitamin D deficiency not a serious problem.

It might also be consumed as an ordinary ingredient in the diet, perhaps mixed with other vegetable fat devoid of carotene. It is used by the natives of West Africa as a culinary oil in much the same way that butter and various vegetable fats are used in Europe. In the Coonoor Laboratories it has been found that palatable mixtures of vegetable oil (*e.g.*, cocoanut) and red palm oil, containing carotene in such proportions that the vitamin A content of the mixture is roughly equivalent to that of good butter, can be prepared. Some destruction of carotene takes place on heating such mixtures, but enough remains to be of value. It might be feasible to prepare a palatable margarine-like product based on a mixture of hydrogenated fat and red palm oil.

The question of introducing the palm *elaeis guineensis* into South India should receive attention on the part of agricultural authorities. The climate of South India would probably be suitable for its cultivation.

Note issued by the I. R. F.A.

MEDICAL NOTES AND NEWS

RANGOON TO FIGHT TUBERCULOSIS

To make the city clean from tuberculosis scourge is the determination of the Rangoon Corporation.

This is evident from the appointment of a sub-committee by the Corporation to carry out such measures as are necessary to improve the public health conditions with particular reference to tuberculosis.

The sub-committee on the other hand has submitted a report to the Corporation. The report which will be considered shortly, lucidly explains the growth and spread of tuberculosis in the city and says that no less than 1,036 persons died last year of this menace to humanity.

It suggests widespread development of anti-tuberculosis organizations and scientific researches with particular reference to conditions prevailing locally.—*Calcutta Municipal Gazette.*

H. DE SA SILVER JUBILEE PRIZE

The Bombay Obstetric & Gynæcological Society has selected the following subject for the thesis for the above prize for 1937-38:—

'MORBIDITY AND MORTALITY OF MOTHER AND CHILD IN BREECH LABOUR WITH LOCAL STATISTICS.'

The prize is open to all medical persons registered by the Bombay Medical Council and of not more than five years' standing. Time to submit the thesis will be sometime in March, 1938.

Further particulars are obtainable from the Hon. Secretaries of the Society, Raj Bhuvan, Sandhurst Road, Bombay 4.

GENERAL PRACTICE—LITIGATION

Dr. Robert Forbes, M.B., CH.B., J.P., Secretary, the Medical Defence Union, London, urges on the necessity of every practitioner in joining the Society soon after passing the final examination. The annual subscription is £1 per annum and it will provide full cover against professional risks. He cites 16 cases illustrating difficulties encountered by physicians out of their professional acts or omissions—alleged or real. He then gives in the following lines the pleas for the utility of such a defence union for the benefit of the medical profession: "(a) No one engaged in the practice of medicine, in whatever branch, is immune from attack by litigious patients.

(b) No one can tell from what source attack is likely to emanate or in what quarter it may be necessary to institute an action to defend his professional character and reputation.

(c) The sums awarded in damages against practitioners for proved negligence are increasing in amount.

(d) Careful handling of cases in the early stages may often cut short an expensive legal action.

(e) The premium is so small and the financial risk so large that it is nothing but foolhardiness for any practitioner to remain outside a defence organisation.

(f) Practitioners who join such an organization are assisting in building up a fund to maintain and support important professional principles when these are assailed by litigants, a position which cannot be attained except by collective action." (*Practitioner*, March, 1937, pages 312-16).

INDIAN SCIENCE CONGRESS

The 25th session of the Indian Science Congress will be held at Calcutta from the 3rd to the 9th January, 1938.

The President of the Section of Medical Research Sir Upendranath Brahmachari, Kt., on behalf of the Committee invites medical men to enrol as members and contribute papers to its deliberations. The subscription for membership should be sent to the Honorary Treasurer, Indian Science Congress Association, 1, Park Street, Calcutta.

Papers which should be accompanied by three typed copies of an abstract not exceeding 200 words and without diagrams should reach the President at 82/3, Cornwallis Street, P. O. Shambazar, Calcutta. Papers published or submitted for publication elsewhere will not be accepted. In accordance with the rules of the Association only Ordinary and Full

Session Members have the right to contribute papers to be read at the Session of the Congress. Associate and Student Members must have their papers communicated by an Ordinary Member. In the case of joint papers, each author must be a Member of some category.

Under the new rules the abstracts will be printed in final bound form before the meeting. The Executive Committee have decided that no abstracts will be printed *unless accompanied by the full paper at the time of submission.* This rule will be strictly enforced.

In addition to the reading of papers, it is hoped to arrange some general discussions. Suggestions regarding suitable subjects for discussion will be welcome, and should be sent to the President at a very early date.

Abstracts of what members intend to say at such discussions should reach the President by the 1st October, 1937.

ALL-INDIA OPHTHALMOLOGICAL SOCIETY

The fifth conference of the Society was held on the 18th, 19th and 21st December, 1936, in the Patiala Block of the King Edward Medical College, Lahore. A large number of visitors and members were present at the opening of the Conference.

Members and visitors assembled in the hall at 10-15 a.m. on the 18th for the formal opening of the Conference. In the unavoidable absence of the President Lt.-Col. R. E. Wright, I.M.S., Lt.-Col. Dick, I.M.S., the local Secretary, introduced Rai Bahadur Mathra Das Pahwa, Chairman of the Reception Committee, and called upon him to welcome the members. In his address he referred to the eye diseases prevalent in the Punjab and the work done by Col. Smith and others to mitigate the sufferings of the people of the province. He hoped that the delegates would have an enjoyable stay in the city.

Sir Saheb-ud-din, Khan Bahadur, the Honourable Minister for Education was then requested to open the Conference. In declaring the Conference open he referred to the high prevalence of eye diseases in the Punjab and eulogised the services rendered by the physicians and surgeons to deal with the situation.

Lt.-Col. Dick then formally proposed that in the unavoidable absence of the President-elect Lt.-Col. E. O'G Kirwan, I.M.S., Dr. B. K. Narayana Rao, Director, Minto Hospital, Bangalore, be elected to the presidentship of the Conference. Dr. Srinivasan seconded the proposal which was carried unanimously.

In the course of his address Dr. Narayana Rao referred to his difficulties in being called upon to preside at the eleventh hour over the deliberations of the Conference. He spoke of the present position of ophthalmic work in this country, specially in Southern India. He referred to the work done in the Mysore State for eye diseases, specially on the preventive side.

As there was sufficient time left at the opening session a few papers were read.

The opening paper on the Symposium on Diabetes and Eye Affections by Dr. S. K. Mukherjee was read by Dr. B. N. Bhaduri in the absence of the author. Then Dr. Banaji read an interesting paper on the Operation of Iridencleisis. The opening session closed with another paper on Drug Idiosyncrasies in Ophthalmic Practice by Dr. B. K. Narayana Rao and Dr. M. Ponnambalam, which was read by Dr. Krishnamoorty. A few members including the President took part in the discussion on the last paper.

In the evening session at 2 p.m. the following papers were read:

1. Results of Cataract Extraction in Diabetes, by Dr. C. N. Shroff.

2. Ocular Complications in Diabetes with special reference to Bengal, by Dr. Md. Refatullah.

3. Diabetes and Retinal Hæmorrhage, by Dr. S. N. Kaul.

4. Refractive changes in Diabetes, by Dr. S. K. Bagchi.

5. Ocular Injuries and the incidence of Sympathetic Ophthalmia in South India, by Drs. B. K. Narayana Rao and M. S. Mehkri.

Many members took part in the discussion on these papers and interesting observations were made.

At 4 p.m. a group photograph of the members was taken, after which Col. A. M. Dick and Mrs. Dick were At Home to members of the Society at Nedous Hotel. After tea some of the delegates were shown round the Shalimar Gardens in the city.

In the morning of the 19th at 10 a.m. Rai Bahadur Mathra Das demonstrated the intracapsular operation for cataract in the Mayo Hospital Eye Theatre. The scientific session commenced punctually at 11 a.m. and the following papers were read:

1. Modifications in Smith's Intracapsular Cataract Extraction to make it Easier and Safer for the Conditions in India, by Dr. C. N. Shroff.

2. Technique of Cataract Operations followed in the Eye Infirmary, Calcutta Medical College Hospital, by Dr. H. K. Indra.

3. Treatment of Senile Cataract by Smith's Technique, by Dr. Sohan Singh.

4. Observations about "Capsulencleisis in Glaucoma," "Iridectomy ab externum" and "Secondary Stitch in Extraction," by Dr. P. D. Giridhar.

5. Incision with Conjunctival Bridge in Cataract Extraction, by Dr. P. D. Giridhar.

6. Observations on the Curative Value of different Operations in Chronic Glaucoma, by Dr. Harbhajjan Singh.

In the afternoon at 2 p.m. the following further papers were read:

1. Some Observations on a case of "Primary Glaucoma with Report of a Case of Marked Recovery of Vision," by Dr. M. S. Mekhri and Dr. K. Krishna Murthy.

2. Transplantation of Cornea. Report of two cases, by Dr. B. K. Narayana Rao and Dr. M. P. Krishna Rao.

3. Corneal Grafting, by Lt.-Col. E. O' G. Kirwan, I.M.S.

4. A Few Cases of Corneal Grafting, by Dr. S. K. Mukerjee.

5. Contact Glasses and their Uses with an Account of Ten Cases, by Dr. P. K. Biswas.

6. Colour Vision Testing, by Dr. J. Cairns.

7. A Case of Syphilitic Tarsitis, by Dr. S. N. Mitter.

8. Static and Dynamic Retinoscopy, by Dr. Jaggan Nath Piplani.

9. Intracapsular made easier than Capsulotomy, by Dr. K. C. Dutt.

At about 4-15 p.m. Rai Bahadur Mathra Das and Mrs. Mathra Das were At Home to the members in their house.

A meeting of the Committee was held at 6 p.m. in Lt.-Col. Dick's place.

At 8-30 p.m. the annual dinner of the Society was held in Nedous Hotel. A large number of members attended the function. Toasts of the King-Emperor and of the Society were proposed and responded to.

On the 20th at 12 a.m. the members were taken by car to Amritsar and were shown round the town. They visited the Golden Temple and were entertained by Dr. Sohan Singh in his house at 4 p.m. The party came back to Lahore by 8 p.m.

In the morning of the 21st the members assembled in the Patiala Block at 10 a.m. The following papers were then read and discussed:

1. Congenital Retinal Fold, a Case Report by Dr. M .S. Mekhri and Dr. K. Krishna Murthy.

2. Acute Keratoconus, by Dr. M. S. Mekhri.

3. Persistent Hyaloid Artery—Report of 3 cases, by Dr. S. Vasudeva Rao.

4. Three Cases of Thrombosis of Central Retinal Vein, by Dr. S. Vasudeva Rao.

5. Congenital Retinal Fold, by the Staff of the Government Ophthalmic Hospital, Madras.

6. Ectopia Lentis.

7. Late Effects of Radium in a Case of Angioma of the Lid.

8. Tuberculoma of Lid, by Dr. S. N. Kaul.

9. Retinal Hæmorrhage Cured, by Dr. S. N. Kaul.

10. Proptosis after Retro-ocular Hæmorrhage, by Dr. S. N. Kaul.

11. Influence of Dark Adaptation on the Variation of Intraocular Tension in Epidemic Dropsy Patients, by Dr. B. N. Bhaduri and Dr. C. K. Biswas.

12. Operative Treatment of Glaucoma in Bengal, by Capt. S. C. Dutt.

In the last session at 2 p.m. the following papers were read:

1. Orbital Tumours, by Rai Bahadur Dr. S. H. Pandit, with demonstration of two cases.

2. Therapeutic value of Iodine in Infections of the Eye, by Dr. Pratap Singh Sindhu.

3. Incidence of Different Refractive Errors in our Hospital Practice, by Dr. M .P. Krishna Rao and Dr. M. B. Sundara Rao.

In the absence of the authors and for want of time a large number of papers received were taken

as read. Before the conclusion of the session two films were shown to the members.

(1) Film on " Lamps of Life," sent by Lt.-Col. E. O'G. Kirwan, Hony. Secretary, Blind Relief Association, Bengal (demonstrated by Dr. P. K. Biswas).

(2) Intracapsular Cataract Operation, by Rai Bahadur Mathra Das.

At 3-45 p.m. the general meeting of the members was held under the presidentship of Dr. B. K. Narayana Rao.

At 4-30 p.m. the Students' Union of the Medical College, Lahore, was At Home to the members in the College Grounds.

Thanks of the Society are due to the members of the Reception Committee for all the arrangements made to ensure the success of the Conference. The grateful thanks of the Society are also especially due to Lt.-Col. Barucha, I.M.S., Principal, Medical College, for so kindly lending the use of the Lecture Hall in the Patiala Block, King Edward Medical College, Lahore, for its meetings.

BOMBAY MEDICAL UNION ON REORGANISATION OF I. M. S.

At a Special General Meeting of the Members of the Bombay Medical Union held on 31st March, 1937, to consider the Recent Communique of the Government of India of 25th March, 1937, regarding the Scheme of Re-Organisation of the I. M. S., the following resolutions were passed:—

(1) The Bombay Medical Union condemns unequivocally the policy of so-called Re-organisation of the I. M. S., as announced in the recent Communique of the Government of India, on 25th March, 1937.

In practice this policy means perpeutation of the European element in the service and elimination of the Indian element.

(2) The Bombay Medical Union hereby reiterates its oft-repeated demand for the complete abolition of the Civil side of the I. M. S.

I. G. C. H. FOR C. P.

His Excellency the Viceroy has selected Lt.-Col. D. H. Rai, M.C., M.D., CH.B., (Edin.), M.R.C.P. (Lond.), I.M.S., officiating Inspector-General of Civil Hospitals, Punjab, for appointment as Inspector-General of Civil Hospitals, Central Provinces, in succession to Col. N. M. Wilson, O.B.E., I.M.S., granted leave.

UNQUALIFIED PRACTITIONER FINED

Judgment has been delivered by the Additional District Magistrate of Jullundur in a case under Section 6 of the Indian Medical Degrees Act, 1916, and under Section 23 of the Punjab Medical Registration Act II of 1916, in which one Hazara Ram Dard of Nawanshar, District Jullundur, an unqualified medical practitioner who exhibited the qualifications " registered " medical practitioner was found guilty and was fined Rs. 50/- or in default two months' imprisonment. The complaint was lodged by the Punjab Medical Council, with the sanction of the Local Government.

RECOGNITION OF PUNJAB UNIVERSITY QUALIFICATIONS

An intimation has been received from the Registrar of the General Medical Council of Great Britain to the effect that the medical qualifications of the Punjab University have been recognised with effect from February 25, 1930. These qualifications were recognised only up to February 24, 1930. The significance of the retrospective effect to this notice is that now there will be no gap in the recognition of these qualifications by the General Medical Council.

The Executive Committee of the General Medical Council have deferred their decision on the recognition of the medical qualifications of the Universities of Calcutta and Rangoon till their next meeting on 24th May, 1937.

ASSOCIATION NOTES

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION

SECTIONAL SUB-COMMITTEES.

MEDICINE:

1. Dr. P. K. Ghosh, M.B., D.T.M. (Cal.), M.R.C.P. (Lond. & Edin.), T.D.D. (Wales), *Convener.*
2. Dr. S. C. Sen Gupta, M.D., F.R.C.S. (Edin.).
3. Dr. S. C. Chatterjee, M.B. (Cal.), M.R.C.P. (Lond), M.R.C.S. (Eng.).
4. Dr. J. C. Banerjee, M.B. (Cal.), M.R.C.P. (Lond.), M.R.C.S. (Eng.).
5. Capt. P. Ganguli, B.A., L.M.S., D.T.M.

SURGERY:

1. Dr. Amiya Kumar Sen, M.B. (Cal.), D.P.H. (Lond.), F.R.C.S. (Eng.), *Convener.*
2. Dr. Santosh Kumar Chatterjee, B.SC., M.B. (Cal.), F.R.C.S. (Edin.), D.L.O. (Lond.).
3. Dr. Dinesh Chandra Chakraborty, L.M.S. (Cal.), F.R.C.S. (Edin.).
4. Dr. Subodh Datta, M.B. (Cal.), L.M. (Rot.), F.R.C.S. (Edin.).

OBSTETRICS & GYNÆCOLOGY & DISEASES OF CHILDREN:

1. Dr. A. K. Acharya, M.B. (Cal.), M.R.C.S., L.R.C.P., D.G.O. (Dublin), D.C.O.G., *Convener.*
2. Dr. P. C. Rakshit, M.SC., M.B.
3. Dr. M. N. Sarkar, B.A., M.B., F.R.C.S. (Edin.).
4. Dr. H. N. Roy, M.B., M.C.O.G. (Edin.).
5. Dr. Miss Maitrayee Bose, M.B. (Cal.), M.D. (Munich).
6. Dr. S. N. Sen, M.B., M.R.C.P. (Edin.).

PATHOLOGY & BACTERIOLOGY:

1. Dr. H. N. Chatterjee, M.B., *Convener.*
2. Dr. C. C. Basu, B.A., M.B.
3. Dr. A. C. Ukil, M.B., M.S.P.E. (Paris).
4. Dr. A. K. Hazra, M.B., B.S. (Bomb.), D.T.M. (Bengal).
5. Dr. M. N. De, M.B., M.R.C.P. (Lond.).

PREVENTIVE MEDICINE, HYGIENE & PUBLIC HEALTH:

1. Dr. M. U. Ahmad, M.B., L.R.C.P., L.R.C.S. (Edin.), L.R.F.P. & S. (Glas.), D.P.H., *Convener.*
2. Dr. J. Chaudhury, M.B. (Cal.), D.P.H (Lond.). D.T.M. (Liv.), D.P.H. (Edin. & Glas.).
3. Dr. P. K. Sen, M.B. (Cal.), M.D. (Berlin), T.D.D. (Wales), PH.D. (Wales).

PHYSIOLOGY, NUTRITION & BIOCHEMISTRY.

1. Dr. Sourindra Mohan Banerjee, M.SC., M.B. (*Convener*).
2. Dr. J. N. Dutt, B.SC., M.B.
3. Dr. B. C. Guha, D.SC., PH.D.,
4. Dr. S. N. Ray, PH.D.
5. Dr. R. K. Pal, M.SC., M.B., M.R.C.P. (Edin.), D.SC.

RADIOLOGY & ELECTROTHERAPY:

1. Dr. Sambhu Nath Mukherjee, M.B. (Cal.), D.M.R.E. (Cantab.), *Convener.*
2. Capt. P. B. Mukherjee, B.SC., M.B., D.M.R.E. (Cantab.), F.R.C.S. (Edin.).

OTO-RHINO-LARYNGOLOGY:

1. Dr. K. K. Ghosh, M.B. (Cal.), F.R.C.S. (Edin.), D.L.O. (Lond.), *Convener.*
2. Dr. U. N. Das, M.B., F.R.C.S.
3. Dr. J. K. Dutt, M.B., F.R.C.S., &c.

OPHTHALMOLOGY:

1. Dr. N. K. Munshi, M.B. (Cal.), D.O.M.S. (Lond.), *Convener.*
2. Dr. B. N. Bhaduri, M.B.

VENEREAL DISEASES:

1. Dr. J. M. Modak, M.B., CH.B. (Edin.), M.R.C.P. (Edin.), *Convener.*
2. Dr. Sudhir Kumar Ghosh, M.B.
3. Col. K. K. Chatterjee, F.R.C.S.I., I.T.F.

HOOGHLY, CHINSURA & CHANDERNAGORE BRANCH

The first meeting of the newly formed Executive Committee of the Hooghly-Chinsura-Chandernagore Branch of the Indian Medical Association was held on the 11th May, 1937, at the residence of Dr. J. Sreemani at Chandernagore. Ten members out of 14 attended. A fair number of medical practitioners also attended as visitors. Dr. M. N. Chakravarty presided.

The proceedings of the Inaugural meeting were read and confirmed. Dr. S. Chatterjee and Dr. A. Palit were co-opted as members of the Executive Committee. A sub-committee composed of 9 members in 3 groups was formed to enlist members from different areas. The Treasurer was authorised to open and operate the Postal S. B. Accounts and sanction was accorded to accept full membership fee in 3 instalments within six months.

Dr. Sreemani, the host was all attention to the guests who were treated to sumptuous dishes.

JALPAIGURI BRANCH

The Second Seminar meeting of the Jalpaiguri Branch was held on the 2nd April at 7 p.m. in the clinical lecture room of the General Hospital, Jalpaiguri. Capt. E. G. Montgomery, B,A, M.SC., M.B., CH.B., I.M.S., Civil Surgeon, Jalpaiguri, read a paper on "The Synthetic Anti-malarial Drugs." All the members of the Association and other medical practitioners of the town as well as medical officers of the hospital and Jackson Medical School joined the meeting. Capt. Montgomery dealt at length on the history of the synthetic anti-malarial remedies, their compositions and chemical properties, etc. He made a comparative statement of the actions of different antimalarial remedies on the different malaria parasites in their various stages of development. He also discussed on the toxic actions of the drugs, effects of their abuses and their proper dosage. There was a lively discussion on the subject in which many members took part. After he finished his paper the medical men present in the meeting were led to the surgical ward of the hospital by Dr. G. Bhaduri, M.B., Teacher of Surgery and Midwifery of the Jackson Medical School. Two interesting and complicated surgical cases were shown to the members and explained to them in detail by Dr. Bhaduri and Capt. Montgomery, with the history of the cases, clinical data and the operations performed. The meeting terminated at 9 p.m. with hearty thanks expressed to Capt. Montgomery for his sincere co-operation with the general medical practitioners in such a medical and scientific discussion and also for taking the trouble of reading such a valuable and instructive paper and spending so much of his time with them.

* * *

The Jalpaiguri Branch of the I. M. A. organised a farewell party on the eve of departure of Dr. G. Bhaduri, M.B., Teacher of Surgery and Midwifery, Jackson Medical School. Capt. E. G. Montgomery, Superintendent Jackson Medical School and Dr. S. N. Chowdhury, M.B., who has been posted in place of Dr. Bhaduri here were specially invited to join the function. Dr. G. Bhaduri was a member of this Association from the very starting of this Branch and his help and advice in the cause of improvement of this association was all along counted to be an invaluable one. A tea-party was also arranged on the occasion. Dr. S. Bhowmick, Secretary of the Branch, made a short validictory speech, eulogising the qualities of the head and heart of Dr. Bhaduri and his sweet, inseparable connection with the Jalpaiguri Branch of I. M. A. Capt. Montgomery and Dr. C. Sanyal also spoke on the occasion pointing to the loss of the Jackson Medical School and this town by Dr. Bhaduri's transfer from this place and they wished him success in his future career. Dr. Bhaduri then gave a suitable reply.

S. N. BHOWMICK,
Jt. Hony. Secretary.

TINNEVELLY DISTRICT MEDICAL ASSOCIATION

The Eighth Annual Gathering organised by the Tinnevelly District Medical Association commenced at 3-30 p.m. on Saturday, the 23rd of January, 1937, in the Centenary Hall, Palamcottah. Members numbering 81, including 7 lady doctors, were present. Ten members of the Tuticorin Medical Union, eight members of the Travancore Medical Association, three members of the Ramnad District Medical Association, and one member of the Madura Medical Association, graced the function.

The business meeting commenced at 3-30 p.m. under the presidentship of Lieut.-Col., T. S. Shastry, I.M.S. The Secretary Dr. K. Rama Ayyar, M.B.B.S. (Andhra), read the minutes of the last monthly meeting held at Koilpatti, which were passed.

Then the election of office-bearers was proceeded with:—

President:—Lieut.-Col., T. S. Shastry, I.M.S. (re-elected).

Vice-President—Dr. T. N. Govinda Ayyar, M.B. & C.M. (re-elected).

Secretary & Treasurer:—Dr. K. Rama Ayyar, M.B.B.S. (Andhra) (re-elected).

The following were elected additional members of the Managing Committee:—

1. Dr. Mrs. E. Bernard Carr (for lady members).
2. Dr. K. T. Vengu, L.M.P., Taruvai (for the Rural Medical Practitioners).
3. Dr. T. S. Vaikuntaraman, (for the General Body).
4. Dr. N. Isaac, L.M.P. (for the General Body).

Dr. K. R. Venkoba Rao, L.M. & S., was re-elected as the Auditor-Member of the Association.

At 4-30 p.m. the guests were entertained to tea and light refreshments and music. After a group photograph at 5-15 p.m. with the Surgeon-General and Dr. T. H. Somervell, the function proper began.

Lieut.-Col. T. S. Shastry, I.M.S., the President of the Association offered a hearty welcome to all the members, and guests, and the President of the Reunion in suitable terms. He expressed his thanks to the representatives of the medical profession of the neighbourhood.

Major-General Sir Frank Powell Connor, Kt., D.S.O., K.H.S., L.R.C.P. (London), F.R.C.S. (Eng.), D.T.M. & H., I.M.S., the Surgeon-General with the Government of Madras, opened the proceedings of the Conference as the President of the Reunion.

The Annual Report of the Association for the year 1936, was read out by the Secretary and was adopted. He stated that at the end of the year there were 105 members, and added that the ambition of the Association was to enrol every registered allopathic medical practitioner as a member.

Dr. P. S. Srinivasan, L.M.P., of the Government Headquarters Hospital, Palamcottah, read out the clinical notes on the following interesting cases which were successfully treated at the Headquarters Hospital, Palamcottah:—

1. Fracture of the skull.
2. Gastric and duodenal ulcers together in the same patient.
3. Spinal Injury.

A discussion on these cases followed, Dr. T. H. Somervell and the Surgeon-General contributing to the discussion.

The principal address of the day was delivered by Dr. T. H. Somervell of the Neyyoor Hospital on the subject of "Recent Advances in Surgery." He said that last year he had been to England and the continent for a special study of the very recent advances in surgery and referred in detail to the striking progress made in surgery, especially the use of x-rays in fractures and anæsthesia. He had learnt one lesson and one experience while he was in Vienna. As a loyal Britisher, he was pleased to find that while certain operations were done much better in Vienna than in London, there were others which were done much better in London than in Vienna. There was one matter in which the Viennese surgeons were excelling all others in the world, *viz.*, in the thoroughness with which they conducted their operations and provided for every possible contingency and the meticulous care with which they carried out every little detail. The operations in Vienna were done very very slowly; for some operations three hours and more were taken, but the doctors there did not consider the time wasted: such was the thoroughness and coolness with which they did their work. Dr. Somervell also referred to the wonderful developments in the treatment of fractures of every kind in the famous Doctor Bohler's hospital (the Accident's Hospital) at Vienna.

In the absence of Dr. A. N. Coomarswami, B.A., M.B. & C.M., Superintendent of Ankylostomiasis Campaign in Ceylon, a paper on "Anti-Hookworm Campaign" which he had prepared, was read by Dr. G. N. Kantayya, B.A., M.B.B.S., a member of our Association. With a vote of thanks proposed by Dr. K. Rama Ayyar, M.B.B.S. (Andhra), Honorary Secretary, to the guests, and members of the four Medical Associations, the meeting terminated.

There was an excellent dinner wherein 103 members of the profession participated. Toasts were proposed and replied to as follow:—

The King Emperor—Lieut.-Col., T. S. Shastry, I.M.S.

The Association—Dr. T. N. Govinda Ayyar, M.B., & C.M.

Reply—General Sir Frank Connor, Kt., I.M.S.

The Guests—Lieut.-Col. T. S. Shastry, I.M.S.

Reply—Dr. T. H. Somervell, F.R.C.S.

In the morning at 11 a.m. a Medical Exhibition was held at the Centenary Hall in which seven firms participated.

K. RAMA AYYAR,
M.B.B.S. (Andhra),
Secretary & Treasurer.

* * *

The monthly meeting of the Association was held on the 24th April, 1937, at Tiruchendur under the presidentship of Dr. K. Srinivasaraghava Iyengar, L.M. & S., Civil Surgeon, Tuticorin and the President of the Tuticorin Medical Union. 36 members attended.

The Secretary read the minutes of the monthly meeting held at the headquarters on the 15th of March, 1937, which were passed.

Dr. P. S. Srinivasan, L.M.P., of the Government Headquarters Hospital, Palamcottah, read out the following case-notes on patients who were operated on by Lieut.-Col. T. S. Shastry, I.M.S.:—

1. A case of tumour forearm (left) resembling hydatid cyst.

2. A case of chronic mastoid infection—cholesteatoma—left side.

3. A case of cancer stomach.

4. A case of injury to the abdomen—an accident.

The following specimens in connection with the above were also demonstrated—

(a) Hydatid cyst. (b) Cancer stomach.

Dr. J. T. Moses, Sub-assistant Surgeon, Tiruchendur, showed a case of tubercular glands of neck.

There was a free discussion on all the cases and some of the members participated in the discussions.

Thereafter Lieut-Col. T. S. Shastry, I.M.S., summed up the salient and important features of all the cases.

HEALTH EXHIBITION

A very successful Health Exhibition was arranged in connection with the monthly meeting at Tiruchendur, which was attended by a large number of men and women of all classes and about 150 boys and 100 girls of the local schools.

Lieut-Col. T. S. Shastry, I.M.S., explained in English the defects of our dietary in detail and pleaded for systematic and daily use in every household of hand-pounded bran-rice, milk products (milk, butter, cream and curd), green vegetables and fruit, for encouraging the industry of hand-pounding of rice, growing green vegetables and fruits in adequate quantities and for increased dairy farming. Mr. Pillai rendered Colonel Shastry's speech into popular Tamil for the benefit of the audience.

The Exhibition was kept open till late in the evening and the local Health Inspector explained the exhibits to the teachers, boys and girls in batches of 20.

K. RAMA AYYAR, M.B.B.S. (Andhra),
Secretary & Treasurer.

RAMNAD DISTRICT MEDICAL ASSOCIATION

The seventh annual gathering of the Ramnad District Medical Association (formerly Chettinad Medical Association), took place on Saturday, the 10th April, 1937, at the S. M. S. High School buildings, Karaikudi.

The proceedings began at 10-30 a.m. with the general body meeting presided over by Dr. F. Ysander, Vice-President of the Association in the absence of the President Dr. B. V. Varadachariar, District Medical Officer, Ramnad. The following office-bearers were elected for the new year:—

President—Captain B. Dayananda Rao, A.I.R.O.

Vice-President—Dr. F. Ysander.

Secretary—Dr. K. S. Srinivas.

Joint Secretary—Dr. K. R. Ratnaswami.

Treasurer—Dr. S. Subramanian.

Members of the Executive Committee—Dr. Miss E. Ivatts, Drs. T. S. Shetty, S. Rajaram Bharathi and N. Krishnaswami.

Auditors—M. S. Venkataseshan and R. Bheem Singh.

After the welcome address by Dr. F. Ysander, Rao Bahadur Dr. T. S. Tirumurthi, B.A., M.B. & C.M., D.T.M. & H., was proposed to the Chair. The outgoing Secretary Dr. T. S. Shetty presented the report for the year 1936-1937 and it was adopted.

In moving the following resolution from the Chair —" The members of the Ramnad District Medical Association place on record their sense of great loss sustained by the medical profession by the demise of Dewan Bahadur Dr. C. Natesa Mudaliar, M.L.C., and authorise the Secretary to convey to the members of the bereaved family their sympathy in their grief." —Dr. Tirumurthi made an appreciative reference to the work of the late Dr. Natesa Mudaliar in the cause of the profession and hoped that the public would raise a suitable memorial to him. This resolution was passed unanimously, the whole gathering standing.

In his presidential address Dr. Tirumurthi felt sorry that Dr. B. V. Varadachariar, the President of the Association, was not present at the Conference as he had to go on leave due to indifferent health. On behalf of those assembled and of himself, the Secretary was authorised to communicate to Dr. Varadachariar their hope that he is improving in health and prayed for his perfect recovery, happiness and long years of usefulness to the profession.

Dr. V. Rama Kamath spoke of the good work done by the Ramnad District Medical Association which was replied to by Drs. S. Subramanian and T. S. Shetty.

Messages from sister associations and well-wishers were read after which the gathering adjourned for lunch.

The afternoon session started with a paper on " Traumatic affection of joints " by Dr. R. Kalmegham of Trichinopoly. Dr. S. T. Achar, M.D., of Tanjore could not attend the meeting and in his place Dr. S. Padmanabha Sarma, M.B. & C.M., District Medical Officer, Madura, spoke on " Empyema." The Chairman delivered an interesting and impressive lecture on " Modern Conception of the Pathology of Bright's Disease."

After discussion on these subjects the President in his concluding remarks congratulated the Association on its usefulness to the profession and was greatly pleased to find that members from distant parts attended the meeting.

CORRESPONDENCE

The Editor is not responsible for views expressed in these columns.

MEDICAL LIFE ASSURANCE

THE EDITOR,
Journal of the Indian Medical Association.

Dear Sir,

I have read with great interest Dr. J. C. Cursetji's paper on Medical Life Assurance as published in the April issue of your journal and also read your editorial on the same subject in the same issue.

The accusations made by Dr. Cursetji against the 4,000 medical examiners may be right but I am very sorry that as the Chief Medical Officer of the Oriental Government Security Life Assurance Co. (one of the biggest in the East) Dr. Cursetji has done nothing to stop these malpractices.

Unless the medical examiners are appointed by the Chief Medical Officer of a Life Assurance Co. and all proposals are distributed equally to all medical examiners, these malpractices will not stop.

At present the medical examiners are appointed by the Managing Agents or Directors (not by the C. M. O.) on the recommendations of the local agents or canvassers without enquiring if the medical practitioner concerned is fully equipped or not. These recommendations from the agents are very often obtained on the condition that they will get a share of the medical fees from the practitioners and just as the Company appoints too many agents to get a lot of cases by their canvassing so also the Company appoints a great number of doctors who will indirectly act as canvassers to secure some proponents for their own benefit.

As for equipments of a medical examiner, many of them have no blood pressure instrument or weighing machine and many have not even a test tube for urine analysis. Even then some of them get more cases than those who are fully equipped. Because these medical men without any equipment will always put the normal figures by calculations from the age of the party and the cases pass as first class without the least trouble.

A lot of money as medical examination fees can be saved if every company receives the proposals first, and the C. M. O. scrunitinises these proposals, and sends them to the medical examiners direct without the knowledge of the local agents for proper medical examination. In such events, there will be no malpractice as the medical examiner will give his independent views of the case and not under the influence of the agent.

In this connection, I beg to suggest that only medical graduates and those fresh from colleges should be appointed and their tenure of service should be ten years only. These men will take much interest in the work and the small income from this source will afford them some relief. A busy practitioner with an established practice is apt to be negligent in sending proper reports (reports are sent without elaborate examinations) and recommends all lives as first class just to satisfy the proponents who are his patients.

The best means of stopping these malpractices is to employ doctors on salaried basis and a few of them in a city. Under this system the Company will get more first class cases and not only will medical expenses be curtailed but the mortality rate will be brought down appreciably.

We, the medical practitioners in general, shall be very grateful to Dr. Cursetji if he will kindly introduce a better system in his Company so that the other smaller companies may follow suit.

The insurance law is being revised. It is time for the Indian Medical Association to introduce some changes which will benefit us and stop the so-called malpractice.

My proposals are:—

(1) All medical examiners are to be appointed by the Chief Medical Officer of a Life Insurance Company.

(2) Medical graduates when available must be given the first preference.

(3) Proposals should be equally distributed to all examiners or else they should be salaried men.

(4) Every medical examiner must sign a declaration before a registered medical practitioner that he possesses a blood pressure instrument, weighing machine and urine analysis equipment and all equipments must be shown to the witness who will bear testimony.

Yours faithfully,

228, Mogul Street,
RANGOON.

NARESH NATH GHOSH, B.SC., M.B.,
Editor & Proprietor, Clinical Digest.

MEDICAL LIFE ASSURANCE

THE EDITOR,
Journal of the Indian Medical Association.

Dear Sir,

I had the pleasure to go through the article "Medical Life Assurance" written by Dr. J. J. Cursetji, Chief Medical Officer, Oriental Life Assurance Co., which appeared in the April, 1937 issue of your Journal.

Firstly, the learned doctor deals with the "Medical examiners' deplorable ignorance of medical science and insurance knowledge for even a fairly good examination of a proponent." And the remedy he prescribes is inclusion of the medical aspects of life insurance in the curricula of the medical colleges and/or post-graduate training in the medical aspects of life insurance. Perhaps he says so because he often finds the disproportion of height, weight, chest and abdomen measurements, and bad estimation of the risk of the life concerned. These he thinks are due to want of knowledge, but with all the respects to the experienced doctor, I beg to differ. No, it is not want of knowledge but something else. It is the influence of agents, canvassers or the

organisers which make the poor medical examiner to err in this way. Perhaps weight of the proponent is somewhat low in proportion to the height and both the examiner and the agent knows that if the exact weight is given, the life won't be accepted as applied for. So by the pressure from the agent or the organiser the medical examiner is bound to increase the weight up to a little above the minimum weight prescribed by the company for the same height. But the poor fellow cannot often make the chest and abdominal measurements proportionate. The same may be applied to blood pressure and other findings, and due to the same influence the examiner cannot give proper opinion about the risk of the life proposed. I think a medical graduate of 5 or 6 years experience either in private or hospital practice is quite efficient to examine cases for life insurance if this unhealthy influence of the agents canvassers or organisers can be removed from him. No amount of post-graduate training can cure the evil if the influence is there.

Next the doctor refers to "The crooked ways and immoral and shady practices by which proposals for life policies are secured and carried through" and "hand-in-glove condition of the agents and canvassers with the medical examiners."

Yes, these are true and it is also a fact that a regular commission system is going on between the agents and the medical examiners, and the agents and the proponents. And I hold the insurance companies responsible for these. Yes, the commission system and fraud cases will go on increasing more and more if the competition between the agents, and doctors becomes harder and harder. I do not think that any amount of strict supervision can stop fraud cases totally.

The root of evil is in company's appointing medical examiners indiscriminately. Nowadays, the companies are appointing too many doctors for a certain city and one doctor is representing several companies while as others of equal qualification are not being able to represent a single one. If one of the latter tries to get himself appointed by a company, he, as a rule learns that the company has got sufficient appointed doctors and that it regrets that it cannot appoint more. But sometimes, perhaps within a month the same company will appoint another doctor for the same area as the latter happens to be a relation or a friend of one of the directors, managers or organisers or influential agents. This is going on in every life insurance office, and as a result, number of appointed doctors for a company is going on increasing and consequently the competition between the doctors to get cases is increasing too. Among these as I have previously mentioned, there are some doctors who represent several companies and depend largely if not solely, on insurance cases for their maintenance. Their position can better be imagined. If they try to be loyal to the companies the agents become displeased and try to avoid them. It is through the agents that the doctors get money from the company and for the sake of maintenance of their family they are to forsake the interest of the company and though, perhaps reluctantly, are bound to keep the agents or the organisers pleased by passing through second class or even third class lives as first class. If the company had had but one appointed doctor for a certain area, the position of the doctor would have been better as he would have cared little for the displeasure of the agents and consequently could have done justice to the company.

Next the companies usually appoint doctors who represent several other companies, and as a result the doctors care for none. If any fraud case done by such a doctor is detected by a company, he ceases to get cases from that company but goes on examining cases for others. The company concerned, perhaps, does not care to inform other companies about the unreliability of such a doctor. If the doctor would have represented only one, he would have been more careful in examining cases and would have thought thrice before passing through a bad life as a good one.

A company when appointing a doctor, enquires whether the doctor has got a good weighing machine, good blood pressure estimating and urine testing instruments, how many companies the doctor represents, how many cases he has during the last year, declared as uninsurable, etc., but in the medical reports the company expects to get an oculo-oto-nas-pharyngo-laryngo,-etc.-etc.-logists in the person of the appointed doctors. Most of the companies want to know from the doctor whether the proponent has got cataract or glaucoma, whether larynx is normal, whether there is any perforation in the ears, etc., etc. Well, a specialist can diagnose a case of cataract, glaucoma or perforation in the ear and one knows how many specialists there are in the list of appointed doctors. Here, the company is helping to make fraud, as it knows fully well that no doctor will be using ophthalmoscope or auroscope in examining a case of insurance. Similarly there is a common question in all the medical forms, in some form or other, "Is he suffering from gonorrhœa or syphilis?" In these days of civilisation every doctor knows about the prevalence of these diseases. But, when examining a case for Insurance, if he asks the proponent the above question, perhaps, 99% will deny. Now what the examiner is to do? He is to search for the lesions of the same throughout the body and if he fails to get one, he is to examine his blood for W. R. before he can write 'No.'

Another question found in many medical forms: Is the sight normal? Well, the doctor is to test the vision of the proponent in one and every case. If, unfortunately, the vision is not normal, he is to find out whether it becomes normal with lenses, if not, the exact cause of defect is to be detected. The appointed doctors, I am afraid, are unable to do all these examinations either due to want of special knowledge of the particular parts to be examined or due to low scale of fees.

I hear that the doctors of good old days did not care for Insurance cases. The agents and proponents had to request the doctors repeatedly before a case could be examined. But now, the reverse is taking place. Then the doctors cared for their practice more than insurance cases. But now, the doctors are going abegging from door to door of the agents for cases as to many of them Life Insurance cases are the only source of maintenance.

I conclude by saying that appointing one doctor for a or part of a city according to its size, and the rule that one doctor should represent only one company, if enforced, are the only ways to minimise the evil of fraud cases in Life Assurance.

Yours faithfully,

Benares City. P. Roy.

BOOK REVIEWS

POST-GRADUATE SURGERY, VOLUME II—EDITED BY RODNEY MAINGOT, F.R.C.S. (Eng.), published by Medical Publications Ltd., 25, Soho Square, London, W. 1., First Edition, 1936, Royal 8 vo. size, 1826 pages with 1134 figures in the text.

Mr. Rodney Maingot is to be congratulated for his Second Volume of Post-graduate Surgery. There is a departure from the old path and one finds more stress given to practical methods.

Instrumental and operative techniques are dealt with in detail with liberal illustrations, which make the book very helpful, but at the same time it has attained a bulk which many would not like.

Introduction of the latest methods of injection treatment and infections of the hand should be welcome. This book would benefit the surgeon more than the student or the practitioner.

AMIYA KUMAR SEN.

VADE MECUM OF MEDICAL TREATMENT BY W. GORDON, M.D. (Lond.), M.R.C.P. (Lond.), published by Edward Arnold & Co., London. First Edition 1937. Double Crown Octavo size, 368 pages.

The author is to be congratulated for providing the senior students and the general practitioners with a book on treatment of diseases most commonly met with in practice in such a convenient form and handy size. The treatments given in it are quite up-to-date including even the details of prostigmin therapy in myasthenia gravis and ergotamine tartrate in migraine. The prescriptions given when dealing with each disease are very useful and will be of great help to the beginner. The inclusion of sections such as common affection of the ear and eye and of various tables, *viz.* obstetrical tables, tables giving caloric value of various food stuffs, the different laboratory tests for clinical diagnosis, etc. has added to the practical value of the book. The book is quite attractive, finely printed and nicely bound for which the publishers deserve credit.

P. G.

SYNOPSIS OF ANO-RECTAL DISEASES BY LOUIS J. HIRSCHMAN, M.D., F.A.C.S., published by C. V. Mosby Company, St. Louis, U. S. A., First Edition, 1937. Double Crown Octavo size, 288 pages with 174 text illustrations and 6 colour plates.

Although written by a specialist in Proctology, the book suits the requirements of medical students and the general practitioners. General practitioners desirous of treating that large proportion of ano-rectal diseases which can be handled safely and successfully outside the field of the limited specialists will find that the technique of diagnosis and therapeutic measures described in this book does not require any costly instruments or complicated and expensive electrical or other apparatus.

The chapter on anæsthesia will be found very useful. The technique of local and caudal anæsthesia has been described in detail and the practitioner will find that he can treat minor affections quite easily without general anæsthesia thus avoiding its unpleasantness and danger.

The technique of the injection treatment for hæmorrhoids has been elaborately written with all practical details and good illustrations.

The diagnosis of some of the major affections of the rectum and colon has been included but their treatment is omitted as it is beyond the scope of this book.

The book is well illustrated and the symptom index at the end of the book will be found useful.

S. K. CHATTERJI.

ACKNOWLEDGMENTS

Added to the List of Exchange (Foreign)

1. La medicina del lavoro.
2. Paris Medical.
3. St. Thomas's Hospital Gazette.
4. Kitasato Archives of Experimental Medicine.
5. Physiotherapy Review.
6. Texas State Journal of Medicine.
7. Instituto Oswaldo Cruz Caixa.
8. Surgery, Gynæcology and Obstetrics with International Abstract of Surgery.
9. New Zealand Medical Journal.
10. Bahia Medica.
11. Psycho-analytic Review.
12. Tohoku Journal of Experimental Medicine.

Books Received for Review

1. Vade Mecum of Medical Treatment. Edward Arnold & Co., 41 & 43, Maddox Street, London, W.1.

2. Practitioners' Library of Medicine and Surgery (Vol. XI). Butterworth & Co. (India). Ltd., Avenue House, Chowringhee Square, Calcutta.

3. Operative Surgery (Vols. I & II). The C. V. Mosby Company, 3523-25 Pine Boulevard, St. Louis, U. S. A.